"A STUDY OF THE USE OF LIGHT WEIGHT AND HEAVY WEIGHT POLYPROPYLENE MESH IN THE REPAIR OF ANTERIOR ABDOMINAL WALL HERNIA''

Dissertation submitted

To

THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY CHENNAI

With partial fulfillment of the regulations for the award of the degree of

M.S (General Surgery)

Branch-I

Government Kilpauk Medical College

Chennai - April 2014

DECLARATION BY THE CANDIDATE

I hereby declare that this dissertation titled **" A study of the use of light weight and heavy weight polypropylene mesh in the repair of anterior abdominal wall hernia "** is a bonafide and genuine research work carried out by me under the guidance of Prof. USHA DORAIRAJAN MS., FRCS., Department of General Surgery, Kilpauk Medical College, Chennai-10.

This dissertation is submitted to **THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY CHENNAI** in partial fulfillment of the degree of M.S. General Surgery examination to be held in **April 2014**.

Date:

Place: **Dr. A. FELIX ANAND RAJ**

CERTIFICATE

This is to certify that this dissertation is the bonafide work of

Dr A.FELIX ANAND RAJ

On

"A Study Of The Use Of Light Weight And Heavy Weight Polypropylene Mesh In The Repair Of Anterior Abdominal Wall Hernia"

During his course in M.S. General Surgery from December 2012 to November 2013 at Government Kilpauk Medical College, Chennai-10.

Prof P.N.SHANMUGASUNDARAM MS., FRCS

Professor and Head of the Department,

Department of General Surgery,

Govt. Kilpauk Medical College,

Chennai-10

Prof USHA DORAIRAJAN MS.,

Professor of General Surgery,

Department of General Surgery,

Govt. Kilpauk Medical College,

Chennai-10

Prof. P.RAMAKRISHNAN MD, DLO

DEAN

Govt. Kilpauk Medical College, Chennai-10

CERTIFICATE BY THE GUIDE

This is to certify that the dissertation titled **"A study of the use of light weight and heavy weight polypropylene mesh in the repair of anterior abdominal wall hernia "** is a bonafide research work done by **Dr.A.FELIX ANAND RAJ**, post graduate in M.S. General Surgery, Kilpauk Medical College, Chennai-10 under my direct guidance and supervision to my satisfaction, in partial fulfillment of the requirements for the degree of **M.S. General Surgery**.

Date:

Place:

Prof. USHA DORAIRAJAN MS., FRCS.,

Professor of General Surgery,

Kilpauk Medical College, Chennai-10

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A Study of the Use of Light Weight and Heavy Weight Polypropylene Mesh In the Repair of Anterior Abdominal Wall Hernia

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ABSTRACT

Title : A study of the use of light weight and heavy weight polypropylene mesh in the repair of anterior abdominal wall hernia.

Keywords : Light weight mesh, Heavy weight mesh, Post operative complications

Introduction :

Hernioplasty by prosthetic mesh has become gold standard for repair of anterior abdominal wall hernia. This study compares the post operative complications following open hernioplasty between the use of composite light weight and heavy weight polypropylene mesh.

Materials and Method :

50 patients included in this study are equally grouped into light weight mesh group and heavy weight mesh group by randomisation. This study is conducted in prospective manner and single blinded. Patients were followed up 6 months post operatively and complications observed were compared and analysed.

Result :

In the heavy weight mesh group, the incidence of seroma formation is 20%, chronic post operative pain and wound infection is 12% each, hematoma

formation is 8%, recurrence and sinus formation is 4% each. In the light weight mesh group, the incidence of seroma formation is 20%, chronic post operative pain and wound infection is 8% each, hematoma formation is 4% and no incidence of sinus formation or recurrence. There are no incidence of mesh infection or enterocutaneous fistula in either group. The analysis of data showed that complications observed are more in heavy weight mesh group although the difference in the incidence of complications between two groups are minimal. Statistical analysis of data showed that the difference in complication rates observed in this study between two groups is not significant.

Conclusion :

There is no significant difference in the use of light weight or heavy weight prosthetic mesh in the open repair of anterior abdominal wall hernia.

INTRODUCTION

INTRODUCTION

Hernia repair is one of the most commonly performed surgeries in globe. Hernia surgery has drastically improved from simple tissue repair method and then prosthetic repair to minimally invasive techniques. Despite the advancement in hernia repair technique and frequency of this surgery, pain remains an important complication following surgery.

Hernia can occur in any site of body, the common site being anterior abdominal wall which includes epigastric, umbilical, spigelian and inguinal hernia, the latter being the most commonly encountered hernia in surgical departments. Inguinal hernias can be direct , indirect or combined type, indirect hernia common among them. Incidence of abdominal wall hernia in general population is estimated around 5%, of which 75% occur in inguinal region.

Different types of mesh are used in repair of hernia nowadays. It can be prosthetic, absorbable or biologic mesh. The composition and structure of prosthetic meshes varies widely, which influence in the healing process following meshplasty.

The complications in patients following hernioplasty using light weight and heavy weight mesh are compared and analysed in this study. The focus of this study is on prevention of post operative pain, when two different types of mesh are used.

AIM AND OBJECTIVES

AIM OF THE STUDY

- To compare the effects of composite light weight and heavy weight polypropylene mesh in the repair of anterior abdominal wall hernia.

- To follow up the patients post operatively and compare the influence of both meshes in the incidence of chronic postoperative pain.

- To compare the incidence of sinus formation and recurrence of hernia following repair with both types of mesh.

REVIEW OF LITERATURE

Management of abdominal wall hernia has been grossly improved from the past to current concepts of prosthetic mesh repair. Minimally invasive techniques are done nowadays for abdominal wall hernia repair using prosthetic mesh.

Surgical repair of inguinal hernia dates back to civilizations of ancient Egypt and Greece. Conservative approach using trusses which were used in the past found to be ineffective. Initially surgical techniques for hernia were radical involving excision of testis and wounds were cauterized and left to granulate on their own, which carried high morbidity and mortality. Inadequate knowledge of the inguinal anatomy and poor understanding of normal hernia formation were cited reasons for those old techniques.

From late 1700s to early 1800s, inguinal anatomy has been studied in detail by renowned physicians of that era Hasselbach, Cooper, Camper, Scarpa, Richter and Gimbernat which lead to improvement in surgical techniques. Marcy, Kocher and Lucas - Championniere are surgeons who performed sac dissection, ligation of sac and closure of internal ring in the same era.

Bassini (1844 – 1924) [1] pioneered in tissue based repair of inguinal hernia. He did dissection of layers of inguinal canal to transversalis fascia and reconstructed posterior wall of inguinal canal in layers. Several modifications of the Bassini's repair has been done. Mc Vay repair and Shouldice repair are other tissue based repairs practiced. Tissue based repairs are mainly used when prosthetic materials are contraindicated.

Prosthetic tension free repair supplants tissue based repair for inguinal floor reconstruction in hernia repair, described first by Lichtenstein where marlex mesh was placed over inguinal floor. Mesh repair is mainly based on concept of Fruchaud's Myopectineal orifice. In all types of inguinal hernia, the defect lay in integrity of fascia transversalis. Prosthetic mesh repair has also been tried with preperitoneal placement of mesh over fascia transversalis by Stoppa, Rives, and Wantz. [1]

Minimally invasive laparoscopic inguinal hernia repair is the most recent transformation in hernia surgery. First described by Ger, Laparoscopic technique reduces postoperative pain and improves recovery. Fitzgibbons and Toy in 1990 described intra peritoneal onlay mesh repair. Arregui in 1991 described Trans Abdominal Pre Peritoneal (TAPP) mesh technique. Duluq in 1991 described Totally Extra Peritoneal (TEP) repair

of hernia. Different newer variety of prosthetic meshes has been tried which improves the patient quality of life and reduce the incidence of recurrence. [1]

Various studies have been conducted in the past regarding the use of light weight and heavy weight polypropylene mesh in the repair of abdominal wall hernia.

A randomized study which was conducted to compare the post operative pain after inguinal hernia repair with the use of light weight and heavy weight mesh has concluded that the incidence of chronic post operative pain is found to be less with the use of light weight mesh but the recurrence found to be increased which may be attributed to technical factors like mesh fixation. [2]

Light weight meshes are technically easy to handle with more flexibility and are associated with fewer incidences of chronic post operative pain and foreign body sensation whereas the recurrence following the use of light weight mesh are higher on follow up, but the majority of the recent studies conducted in higher centre which were published in reputed journals showed no significant difference in the use of

either type of mesh in the repair of hernia. There is increased recurrence rate in light weight mesh repair technique and it also stressed that the material composition significantly influence the foreign body reaction. [3,4]

The Cochrane, review 2012 issue published a randomized prospective study comparing light weight and heavy weight mesh in chronic pain after TEP repair of inguinal hernia concluded that incidence of chronic post operative pain was not significantly affected by the use of either mesh, whereas the foreign body sensation may be less with light weight mesh after TEP inguinal hernia repair. [5]. Another Cochrane, 2012 issue, comparing polyglactine / Polypropylene with standard polypropylene mesh for inguinal hernia repair concluded that the incidence of post operative pain and complications are found to be similar in patients with both groups. [6]

Abdominal wall is an anatomically delicate and layered structure developed from mesoderm with segmentally derived blood supply and innervations. Anterior abdominal wall muscles include external oblique, internal oblique, transverses abdominis, rectus abdominis and pyramidalis

muscle. Aponeurosis of internal oblique, external oblique and transversus abdominis joins to form rectus sheath.

Origin of the external oblique muscle is from lower eight ribs by eight digitations, upper four slips interdigitate with serratus anterior and lower four slips with costal fibres of lattismus dorsi. Extension of the free posterior border of muscle is from twelfth rib to anterior half of outer lip of iliac crest by fleshy fibres. The aponeurotic fibres are medial to line joining anterior superior iliac spine and umbilicus and medial to level of tip of ninth costal cartilage. The fibres are directed obliquely downwards and forwards described as hands in the pocket as they are parallel to one's fingers in this orientation. The free posterior border of muscle forms anterior border of lumbar triangle of petit. [7]

The inguinal ligament of poupart is inferior edge of external oblique aponeurosis reflected posteriorly between anterior superior iliac spine and pubic tubercle. Attached to the inguinal ligament is the fascia lata of thigh. Superficial inguinal ring is an oblique and triangular defect in external oblique aponeurosis just above and lateral to pubic tubercle. The lacunar

ligament of Gimbernat is an extension of medial end of inguinal ligament horizontally backwards to pectin pubis.

The whole length of lumbar fascia and anterior two third of illac crest and lateral two third of inguinal ligaments gives origin to internal oblique fleshy fibres. The muscle runs upwards along the costal margin and becomes aponeurotic at the tip of ninth coastal cartilage. The curved free margin of posterior layer forms the arcuate line midway between umbilicus and pubic symphysis. The rectus muscle is enclosed by internal oblique aponeurosis which rejoins at linea alba. A part of the aponeurosis fuses with transversus aponeurosis to form the conjoint tendon. The free lower border of the internal oblique arches over spermatic cord.

The lateral one third of inguinal ligament, anterior two third inner lip of iliac crest, lumbar fascia, twelfth rib, inner aspect of lower six coastal cartilage gives origin to transversus abdominis muscle. The aponeurotic part forms posterior rectus sheath with internal oblique aponeurosis. The lower fibres of aponeurosis curve downwards immediately with internal oblique to form the conjoint tendon which inserts into the pubic crest and pectineal line.

The two heads of rectus abdominis muscle originates in front of pubic symphysis and the upper part of the pubic crest. The lower heads of the muscle are narrower but the upper parts are borders separated by linea alba. The muscle insert into the front of fifth to seventh coastal cartilage. Three tendinous intersections are unique to this rectus muscle, first one at level of xiphisternum and last one at level of umbilicus and another intersection in middle between this two, which blend inseparably with anterior end of rectus sheath. [7]

The muscle pyramidalis is triangular in shape and arises from body of pubic symphysis in between rectus abdominis and converges with its fellow into linea alba, 4cm above its origin.

Rectus muscle is enclosed by splitting of internal oblique aponeurosis into anterior and posterior layer. Anterior rectus sheath is formed by fusion of external oblique aponeurosis with anterior layer of internal oblique aponeurosis. Transversus aponeurosis fuses posterior to rectus muscle with posterior layer of internal oblique aponeurosis and forms posterior rectus sheath. Midway between umbilicus and pubic symphysis is a transition zone where all the three aponeurotic layers pass in

front of rectus muscle. Posterior layer of sheath as free lower margin called arcuate or semicircular line which is concave downwards. All the aponeurosis is found to be bilaminar and decussating across midline. Iliopubic tract is the the lower part of the transversalis fascia in between pubic bone and illac crest above inguinal ligament where it is thickened.

Inguinal region is a complex network of muscles, ligaments and fascia that are interwoven in a multiplanar fashion. Inguinal hernias are common in men, so the relevant anatomy is mainly discussed with regard to male inguinal canal. The inguinal canal is approximately 4 – 6 cm length, situated in anteroinferior portion of pelvic basin. Inguinal canal is shaped like a cone with its base directing superolaterally and apex pointing inferomedially towards symphysis pubis. Inguinal canal commence at internal inguinal ring, which is anatomically a transversalis fascia defect through which spermatic cord structures in male and round ligament in female enters the inguinal canal. [1]

Iliopubic tract forms the inferior border of internal inguinal ring while fibres of fascia transversalis form the other border of internal ring. Inguinal canal concludes at external inguinal ring, which is external oblique aponeurosis defect. Superficial ring consists of two crura, inguinal

ligament forming inferior crus medial crus and external oblique aponeurosis forming medial crus.

Anterior boundary of inguinal canal is formed by external oblique aponeurosis and internal oblique muscle laterally, posteriorly floor of inguinal canal is formed by fusion of tranversalis fascia and transverses abdominis muscle, superior boundary by arching fibres of internal oblique muscle and inferior margin by inguinal ligament. The inferior epigastric artery which is a branch of external iliac artery supplies the rectus abdominis runs within rectus sheath posterior to rectus muscle along the medial border of deep inguinal ring. [1]

Inguinal hernia that are lateral to inferior epigastric artery are indirect through deep inguinal ring whereas hernia that are medial to inferior epigastric vessel through Hesselbach's triangle are direct type. Hesselbach's triangle is bounded by lateral border of rectus muscle medially, inguinal ligament inferiorly, inferior epigastric vessels along laterally or superiorly.

The spermatic cord consists of vas deferens, pampiniform venous plexus, testicular artery, artery to vas, genital branch of genitofemoral

nerve, lymphatics, connective tissue, remnant of processus vaginalis. The spermatic cord is enveloped in three fascial layers, internal fascial layer from internal oblique muscle contains cremaster muscle, external layer from external oblique muscle and superficial fascia which is called innominate fascia or fascia of gallaydet. Structures that are important to conceptualization of inguinal canal include inguinal ligament, cooper's ligament, iliopubic tract, lacunar ligament and conjoined area.

The inguinal ligament or poupart's ligament is formed by inferior edge of external oblique aponeurosis extending from anterior superior iliac spine to pubic tubercle. Inguinal ligament forms inferior boundary of inguinal canal and thereby used as a important structure and basis for various hernia repairs. Cooper's ligament or pectineal ligament is considered as a lateral portion of lacunar ligament and is fused to periosteum of pubic tubercle. Coopers ligament also include fibres from transversus abdominis, iliopubic tract, internal oblique, rectus abdominis. Iliopubic tract is an aponeurotic band that begins at anterior superior iliac spine and inserts into coopers ligament often confused with inguinal ligament. Iliopubic tract forms on deep side of inferior margin of tranversus abdominis and transversalis fascia. Iliopubic tract helps form the inferior margin of internal inguinal ring, courses medially and continues as the

medial border of femoral canal. The lacunar ligament or gimbernat ligament is the triangular fanning out of inguinal ligament where it joins pubic tubercle. The conjoined tendon is described as fusion of inferior fibres of internal oblique and transversus abdominis aponeurosis. The conjoined area is a combination of transversus abdominis, transversalis fascia, lateral edge of rectus sheath and internal oblique muscle or its fibres.

Below the inguinal ligament lies the femoral space which is divided by iliopectineal arch into medial vascular space and lateral muscular space. The medial vascular space contains femoral branch of genitofemoral nerve, femoral vessels and a potential space medially called femoral canal, which is the site of femoral hernia formation and lateral muscular space contains iliopsaos muscle, femoral nerve, lateral femoral cutaneous nerve. The femoral canal is cone shaped pointing inferiorly extending upto fossa ovalis containing mainly cloquet node and lymphatics.

Nerves which are encountered in inguinal region are ilioinguinal, iliohypogastric, genitofemoral, lateral femoral cutaneous nerve. Entrapment of some of these nerves during hernia repair is considered as main reason for chronic post operative pain. The ilioinguinal

and iliohypogatric nerves arise from first lumbar nerve {L1}. The ilioinguinal nerve emerging along lateral border of psoas major, passing obliquely across quadratus lumborum, crosses internal oblique muscle medial to anterior superior iliac spine and enter inguinal canal between internal and external oblique muscles and comes out through superficial inguinal ring and supplies skin of upper and medial thigh, in males it also supplies penis and upper scrotum while in females it supplies mons pubis and labium majus. The iliohypogastric nerve courses between internal oblique and transversus abdominis supplying both and then branches as lateral cutaneous and anterior cutaneous branches. [1]

The genitofemoral nerve arising from L1-L2 emerging on anterior aspect of psoas divides into genital and femoral branch. The genital branch entering inguinal canal lateral to inferior epigastric artery and contained in spermatic cord structures supplies scrotum and cremaster muscles in males and mons pubis and labia majora in females. The femoral branch courses along femoral sheath supply the skin anterior to upper part of femoral triangle.

Abdominal wall hernia may be congenital or acquired. Though the risk factors are considered multifactorial , the most common cause being weakness of abdominal wall muscles. Congenital hernias are considered as impedance of normal development. Failure of the peritoneum to close results in patent processus vaginalis. Congenital inguinal hernia in children usually presents with patent processus vaginalis. Inguinal hernia in adult are considered generally acquired defect of abdominal wall muscles, the cause being multifactorial.

Weakness of the abdominal wall musculature are single most predisposing factor for hernia formation. Increased intra abdominal pressure with exertion, age related weakness of abdominal wall muscles, obesity, type I to type III collagen deficiency are considered some of reasons behind hernia formation.

The Presumed causes of hernia formation[1] are chronic coughing, chronic obstructive pulmonary disease, obesity, constipation, family history of hernia, cigarette smoking, strenuous physical activity, heavy lifting, upright posture, connective tissue disorders, defective collagen synthesis and previous right lower quadrant incision.

Abdominal wall hernia is the most common type of hernia seen in surgical out patient department. Abdominal wall hernia can be epigastric, spigelian, umbilical, inguinal or femoral hernia. Ventral hernias commonly seen are epigastric, umbilical, para umbilical, incisional hernia and fatty hernia of linea alba. The defect is commonly seen in midline though it can occur on either side of midline. The repair of all types of hernia is based on strengthening abdominal wall muscle after reducing hernia and closing defect.

Various classification system are in practice for inguinal hernia. Classification systems are mainly used to standardize inguinal hernia management so that outcome of different surgery for hernia can be compared and patients are effectively managed. Clinical classification subdivides inguinal hernia into direct, indirect or femoral hernia.

The concept of Fruchaud's Myopectineal orifice [1] considerably changed the Classification system of late. Rather than describing as direct and indirect, Fruchaud described that all the types of hernia are predisposed by common site of weakness, fascia transversalis. With restoration of integrity of the fascia transversalis, recurrence of hernia can be reduced. Ideally any

classification system should be able to stratify hernia and preoperatively itself should guide for deciding most appropriate hernia repair. The boundaries of Fruchaud's Myopectineal orifice are medially by lateral border of rectus muscle, laterally by iliopsoas muscle, superiorly by arching fibres of internal oblique, inferiorly by pecten pubis.

The common classification system used are Gilbert's classification, Nyhus classification, Schumpelick classification. Nyhus system is the most widely accepted classification system.

RIGHT INGUINAL HERNIA

RIGHT INGUINAL HERNIA

LEFT INGUINAL HERNIA

PARAUMBILICAL HERNIA

UMBILICAL HERNIA

Anterior abdominal wall hernia has been managed by mainly two techniques, tissue repair technique and prosthetic mesh repair. Tissue repair techniques are mainly based on strengthening of weak posterior wall muscles after hernia has been reduced. Prosthetic mesh repair techniques are based on placing mesh over defect after reducing hernia. Prosthetic repair of hernia can be done either by open technique or laparoscopic method.

The Tissue repair techniques[1] used for hernia repair are Bassini's repair, Modified Bassini's repair, Shouldice repair, Mc Vay repair, Read – Rives repair, Nyhus and Condon iliopubic tract repair. The Common Open prosthetic repairs performed are Lichtenstein tension free repair, Gilbert's plug and patch technique, Prolene hernia system, Stoppa's or Wantz repair (Giant Prosthetic Reinforcement of Visceral Sac), Kugel's repair. The Laparoscopic prosthetic repairs are Trans Abdominal Pre Peritoneal (TAPP) repair, Totally Extra Peritoneal (TEP) repair', Laparoscopic bilateral inguinal hernia repair, Intra Peritoneal Onlay Meshplasty (IPOM).

TYPES OF SURGICAL MESH

Surgical meshes are characterized and classified mainly based on type of material, specific density, porosity, strength. Broadly meshes are classified into prosthetic and biologic. Permanent prosthetic meshes are made of material that cannot be degraded over time but absorbable meshes are degraded by hydrolytic enzyme activity. Biologic meshes are made from collagen rich porcine, bovine, human tissues, which are incorporated into host tissue, remodeled and eventually replaced by host collagen. Prosthetic meshes are low cost, durable, easy to use that are commonly used in surgical practice.

MESH COMPOSITION[1]

The Prosthetic meshes are different combinations of polyester / collagen film, polypropylene, polypropylene / ePTFE, ePTFE, polypropylene / polyglactin, polypropylene / poliglecaprone, polypropylene / polydioxanone, polypropylene / hyaluronate gel, polypropylene / omega 3 fatty acid, and polypropylene / titanum. The biologic meshes are made from Porcine dermis, Human dermis, Fetal bovine dermis, Porcine small intestinal submucosa. The absorbable type of mesh are polyglactin, polyglycolate, polyglycolide / trimethylene carbonate.

Prosthetic repair of hernia has been universally accepted as standard surgical technique in the management of hernia repair.

MESH SELECTION[1]

Prosthetic meshes are widely used to reconstruct weakened musculature. The choice of mesh selection varies widely due to availability of variety of mesh combination. Refinements in prosthetic mesh technology resulted in application of mesh in tension free anterior repair as well in pre peritoneal repair.

Meshes are grouped based on their material and bio reactivity as non absorbable, partially absorbable, and biologic. Other factors which account for behavior of mesh include thickness, weight, architecture of fibres and overall strength of material. An ideal mesh should be Easy to handle, Provide adequate strength, Be inert, Resist contraction, Avoid infection, Place no restriction on patient function, Simple and inexpensive.

Polypropylene is a synthetic non absorbable mesh that is hydrophobic, electro statically neutral, permanent. The filament size, pore size and weight of mesh differ from different manufacturer. Light weight meshes

have a larger pores that promotes host scarring response. The concept of density is important in synthetic absorbable mesh where fiber diameter and fiber number impacts the pore size. The meshes are divided into heavy weight and light weight types depending on the extent of density.

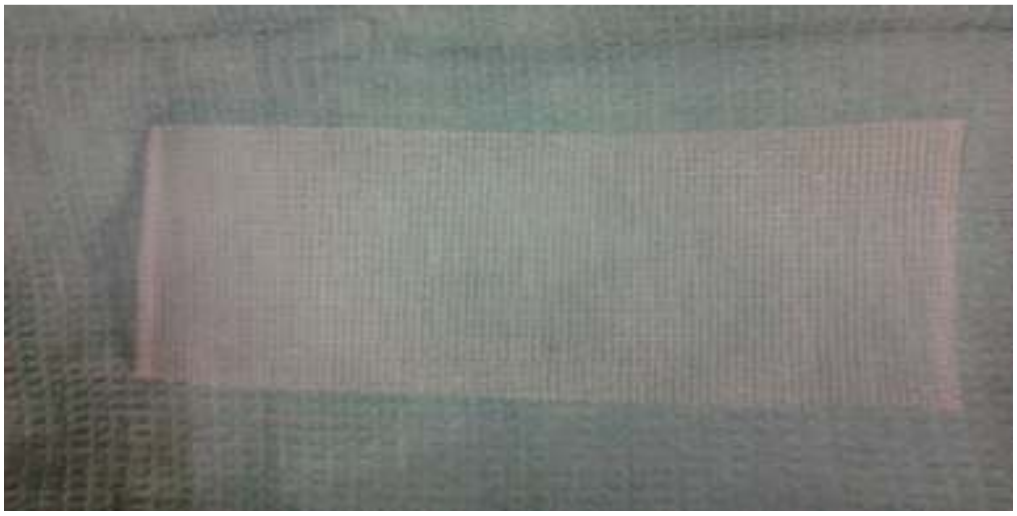
MESH COMPOSITION AND STRUCTURE

The two types of mesh used in this study are Composite light weight type of mesh and heavy weight mesh. The mesh structure and composition varies between two types of mesh which may influence the healing process after meshplasty. The weight of mesh depends on composition of absorbable and nonabsorbable component of mesh.

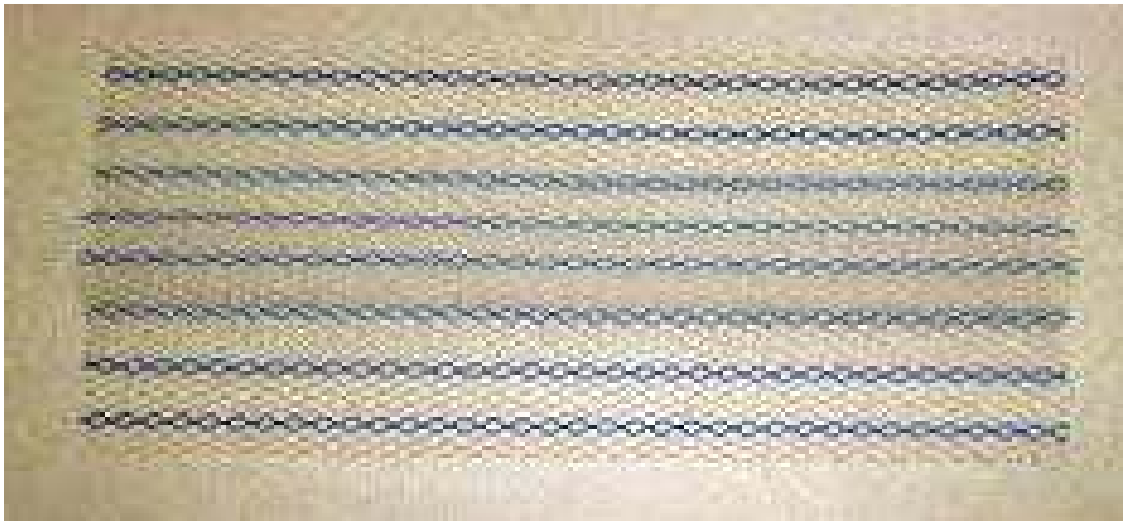
The composite light weight mesh used here in this study is a combination of Polypropylene / Polyglactin.

The heavy weight mesh used in this study is standard Polypropylene mesh.

HEAVY WEIGHT POLYPROPYLENE MESH



COMPOSITE LIGHT WEIGHT MESH



MESH WEIGHT AND COMPOSITION

PROPERTIES	COMPOSITE LIGHT WEIGHT MESH	HEAVY WEIGHT MESH
Fabric weight gms / sq.m	65	120
Tensile strength (Newtons)	220	360
Bursting strength (Newtons)	360	700
Thickness (mm)	0.51	0.70
Monofilament diameter (mm)	0.15	0.15
Pore size (mm)	0.85	0.80

MESH BIOCOMPATIBILITY

Mesh biocompatibility is basically determined by the foreign body reaction . In contrast to physiological wound healing and scar formation, the foreign body reaction at the host-tissue/biomaterial interface is present. The cellular interactions at the mesh/tissue interface proceed over time ending up in a chronic inflammatory process. The time course of the foreign body reaction has been studied extensively and consists of three crucial steps that are protein absorption, cell recruitment and, finally, fibrotic encapsulation and extracellular matrix formation. Each of these steps involves a complex cascade of immune modulators including soluble mediators and various cell types.

Recent research has focused on the cellular and molecular interactions of the distinct phases of the foreign body reaction offering a new basis for therapeutical strategies. The highly dynamic process of the foreign body reaction is considerably influenced by the biomaterial composition. Modifications of the type of polymer, the material weight, the filament structure and the pore size are realized and have substantial effects on the in vivo biocompatibility. Moreover, modern mesh technology aims to utilize the available implants as carrier systems for bioactive drugs.

Studies in animal models account for the efficiency of these drugs that aim to reduce mesh-related infections or to minimize foreign body reaction by influencing inflammation or extracellular matrix remodeling. A thorough understanding of the molecular mechanisms of foreign body reaction provides a sophisticated background for the development of new biomaterials at least as carrier systems for bioactive reagents to reduce inflammation and to improve clinical outcome.

In the reinforcement of the abdominal wall with mesh implants, various complications including hernia recurrence, abdominal pain, seroma formation and infection are discussed to depend on the biocompatibility of the alloplastic prosthesis. Particularly macrophages, T-cells and mast cells have been shown to play a major role in the inflammatory response to biomaterials

POST OPERATIVE COMPLICATIONS

Complications following meshplasty tend to occur though the incidence is low. Life threatening complications are rare following hernia surgery though respiratory and cardiovascular insufficiency may occur. Morbidity following repair with prosthetic meshes mostly confined to local wound related complications. Different factors influence complication rates like patient factors, surgical technique, types of mesh used. Here are a list of common complications post meshplasty which include chronic groin pain[1] which may be nociceptive or neuropathic**,** seroma formation, hematoma formation, recurrence, wound infection, osteitis pubis, ischaemic orchitis, division of vas deferens, prosthetic complications, bladder or bowel injury, paralytic ileus.

POST OPERATIVE PAIN

One of the most important complication following meshplasty is post operative pain. Pain may be chronic or short term. Any pain which lasts more than 3 months following surgery is termed chronic pain, mostly due to nerve entrapment, scar tissue, adherence of mesh. Nerve injuries

usually presents with sharp localized pains, paresthesia, numbness in area where nerve supplies. Ilioinguinal nerve is the most common to get trapped in tension free repairs followed by iliohypogastric nerve. Some surgeons advocate division of nerve as part of surgery as numbness is better tolerated than sharp chronic pains. Most of surgeons still advice identification and protection of nerve. Somatic pain is those due to ligament and muscle damage. Visceral pain may be due to sympathetic plexus injury. Neuropathic pain is due to nerve damage or entrapment manifesting as localized sharp pain.

SEROMA FORMATION

Usually develops within 1 week post surgery, common after prosthetic mesh repair and following large hernial sac repair. Foreign body reaction to mesh or physiologic fluid collection is arrtibuted reasons. Aspiration of seroma is better avoided to prevent secondary infection. Warm compression may be helpful.

HEMATOMA

Localized collection of blood is common around wound site, rectus sheath or even in retroperitoneum at times. It is conservatively managed better. Large hematomas need to be evacuated.

WOUND INFECTION

Hernioplasty are generally clean surgeries where wound infection rate are less than 1 – 2 %. Prophylactic antibiotics reduce the rate of wound infection. It is better to be managed conservatively by appropriate antibiotics.

CORD AND TESTICULAR INJURY

Injury to vas deferens can occur if accidental transection happens. It should be primarily reanstomosed. Ischeamic orchitis is rare < 1% usually manifest 1 week post surgery. Injury to testicular artery may result in testicular atrophy.

RECURRENCE

Recurrence is one of the most dreaded complication. Recurrence rate following prosthetic mesh repair are rare though technical defects and patient factors are found as common reason for recurrence.

MESH INFECTION

Though rare following sterile clean hernia surgery, still can occur. It is the most difficult complication to manage with, where infected part of mesh needs to be removed for complete cure.

STUDY PROTOCOL

MATERIALS

- Patients who were admitted to General Surgery department of Kilpauk medical college hospital with anterior abdominal wall hernia as primary complaint were included in this study.

- The study period was from December 2012 to November 2013.

- Only those patients who were willing to give consent been included in this study and followed up for period of six months post operatively.

INCLUSION CRITERIA

- Patients with primary anterior abdominal wall hernia as primary complaint.

- Patients of both sexes.

- Patients in age group between 30 to 70 years.

- Patients who were willing to give consent for study.

EXCLUSION CRITERIA

- Patients with recurrent hernia in anterior abdominal wall.

- Patients with incisional hernia.

- Patients with strangulated hernia.

- Patients with incarcerated hernia.

METHOD

- 50 eligible patients were chosen after getting informed written consent for study. Patients were allotted to either light weight mesh repair group or heavy weight mesh repair group by randomization. History of presenting complaints, risk factors and clinical findings and diagnosis were recorded. Basic blood investigations and x ray findings were recorded. Lichtenstein tension free hernioplasty and Onlay meshplasty was done depending on the type of hernia. The mesh used in each patient depends on the group to which they were allotted. Patients were followed up for a period of six months post operatively from the day of surgery. Post operative complications if any were individually recorded and treated accordingly and the same were also recorded. Data were finally compiled and analysed.

DESIGN OF STUDY

- The study was conducted in a Prospective manner.

  The study started in December 2012 and concluded in November 2013.

- Randomized controlled study.

  Patients were randomly allotted to either light weight mesh group or heavy weight mesh group. Randomisation was done by simple token technique. Patients were asked to randomly select a token, numbered from 1 to 50. Tokens were already randomly marked as either one of the two group.

- Single blinded study

  Patients were unaware of which group they were allotted.

SIZE OF THE STUDY

- 50 patients divided into 2 groups of 25 each.

INVESTIGATIONS DONE

After clinical diagnosis was made and plan for hernioplasty is made, consent obtained from patient for blood investigations. Basic investigations were done. Blood investigations done were complete blood count, renal function test, urine routine and imaging investigations done were chest x ray, USG abdomen. Blood and imaging investigations are done mainly for anaesthetic assessment purposes. USG is for locating the defect and its dimension. It also gives idea about prostate in males. ECG is also taken along with this.

FACTORS WHICH ARE ANALYSED

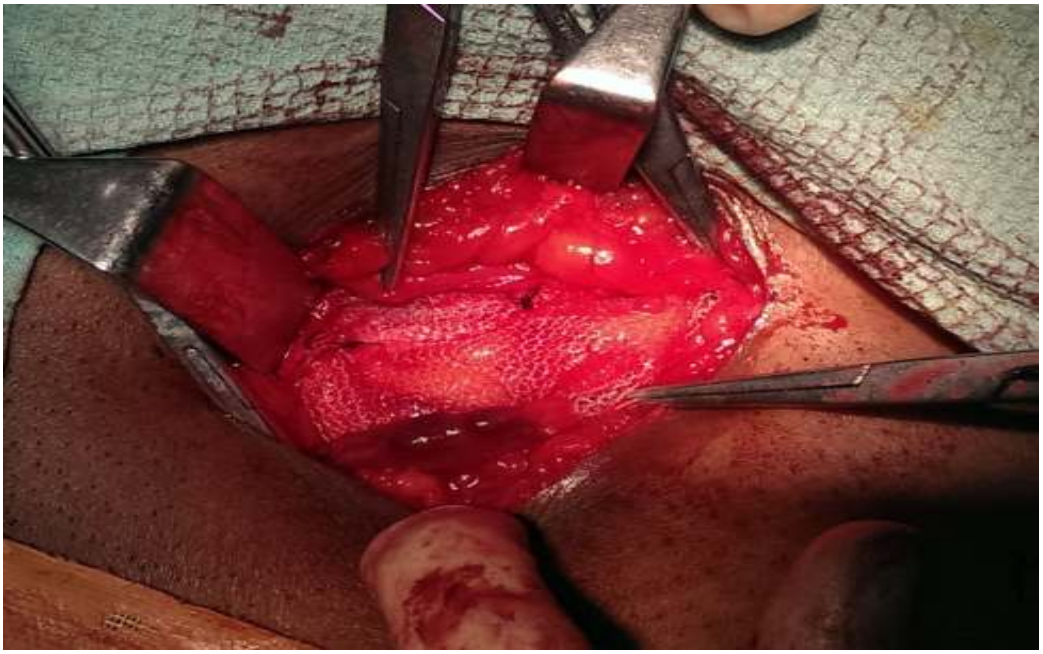
The post operative complications which is analysed in this study are seroma formation, hematoma formation, wound infection, chronic post operative pain, recurrence, sinus formation, mesh infection, enterocutaneous fistula.

Type of procedure done, Mesh used in each individual, and post operative complication if any are recorded in proforma. Data are finally compiled and analysed.

OPERATIVE TECHNIQUE

Inguinal hernias are repaired based on principle of strengthening Fruchaud's myopectineal orifice. Lichtenstein repair using prosthetic mesh is widely accepted universally as tension free technique and the same technique has been done in all patients in this study with groin hernia [9]. Epigastric hernia, paraumbilical hernia, Umbilical hernia are repaired by onlay hernioplasty technique [9]. The type of prosthetic mesh depends on which group the patient has been allotted in this study.

OPERATIVE PICTURES



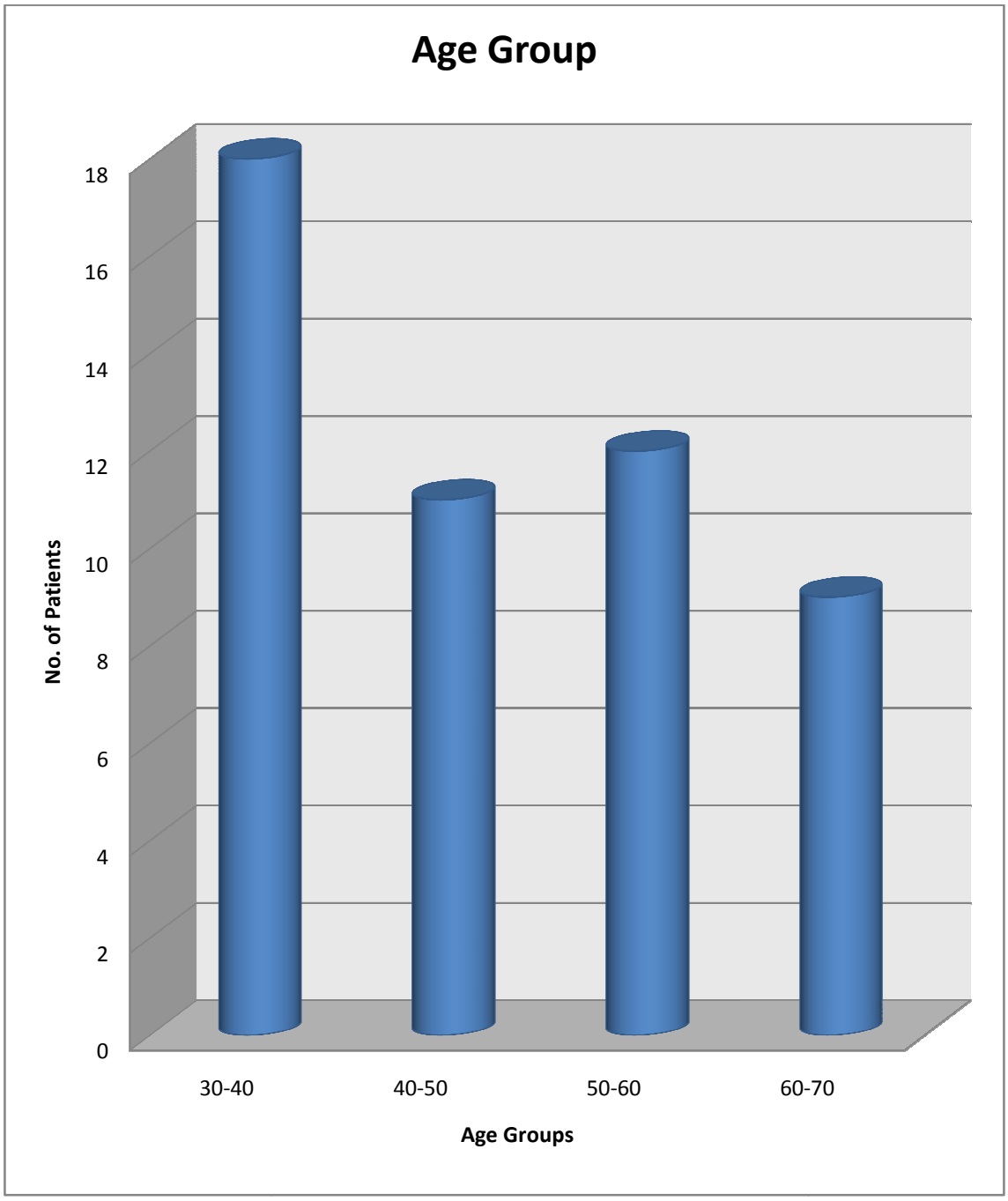
FOLLOW UP

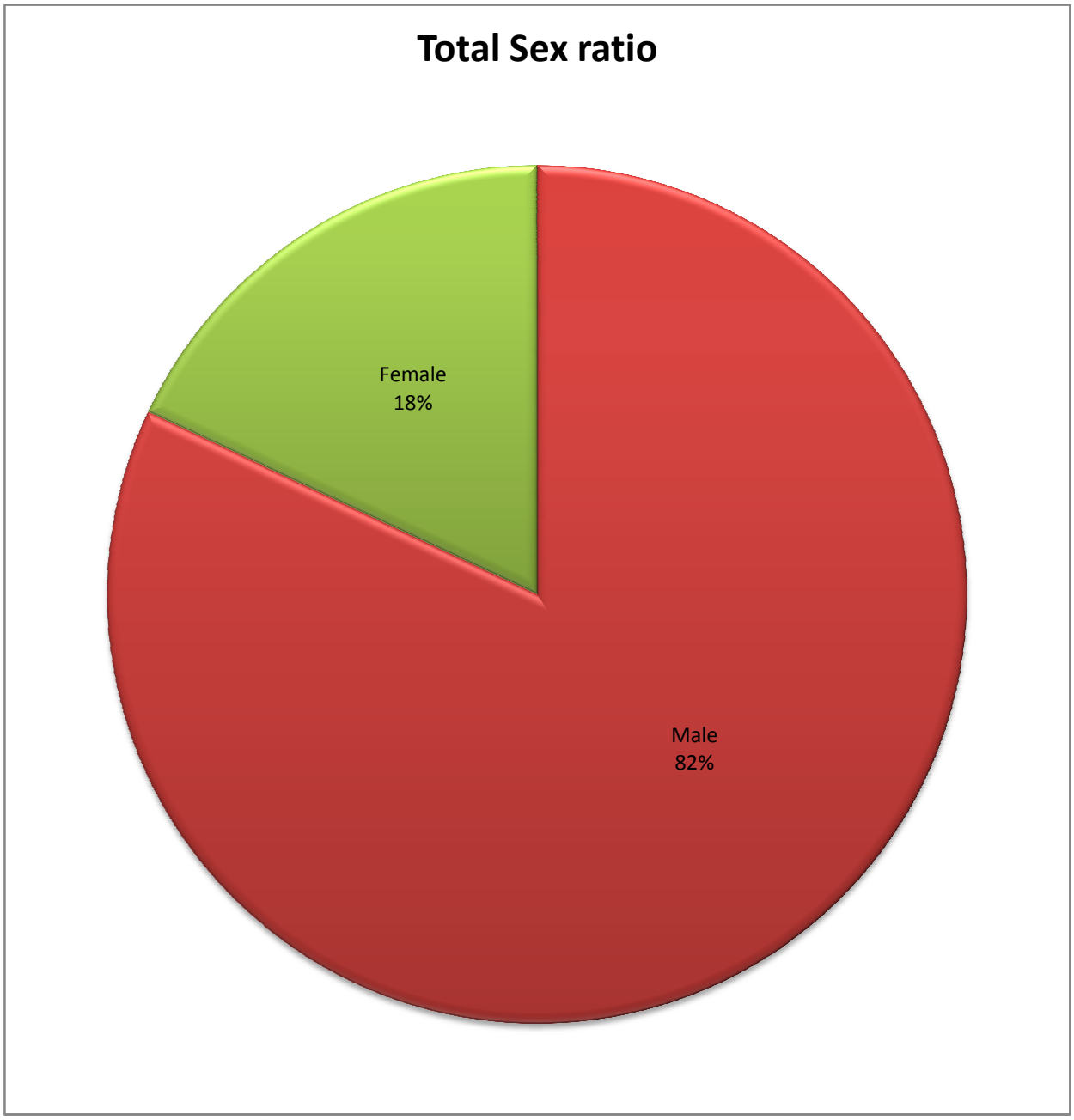
Patients are followed up individually from the day of surgery till six 6 months post operative period. Patients are usually discharged from ward on 5th post operative day and reviewed on 8th day for suture removal. Till the day of discharge, patients are examined on every consecutive day and findings recorded. Then patients are asked to come for review in opd at 8th day, 1 month, 3 month and 6 month post operatively.

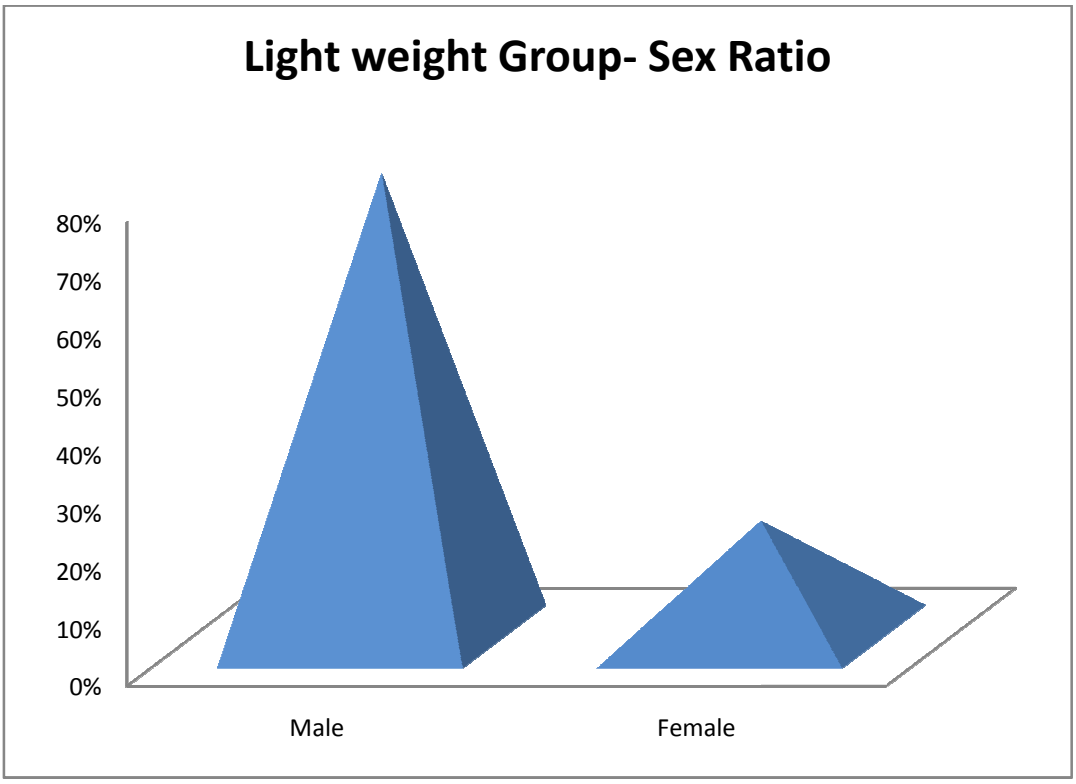
Patients were examined in detail in opd for complications on every review carefully and findings are recorded. Complications are managed effectively if any at the time of presentation. Patient's mobile number and address were recorded to review on call if needed. Observations are recorded and finally analysed.

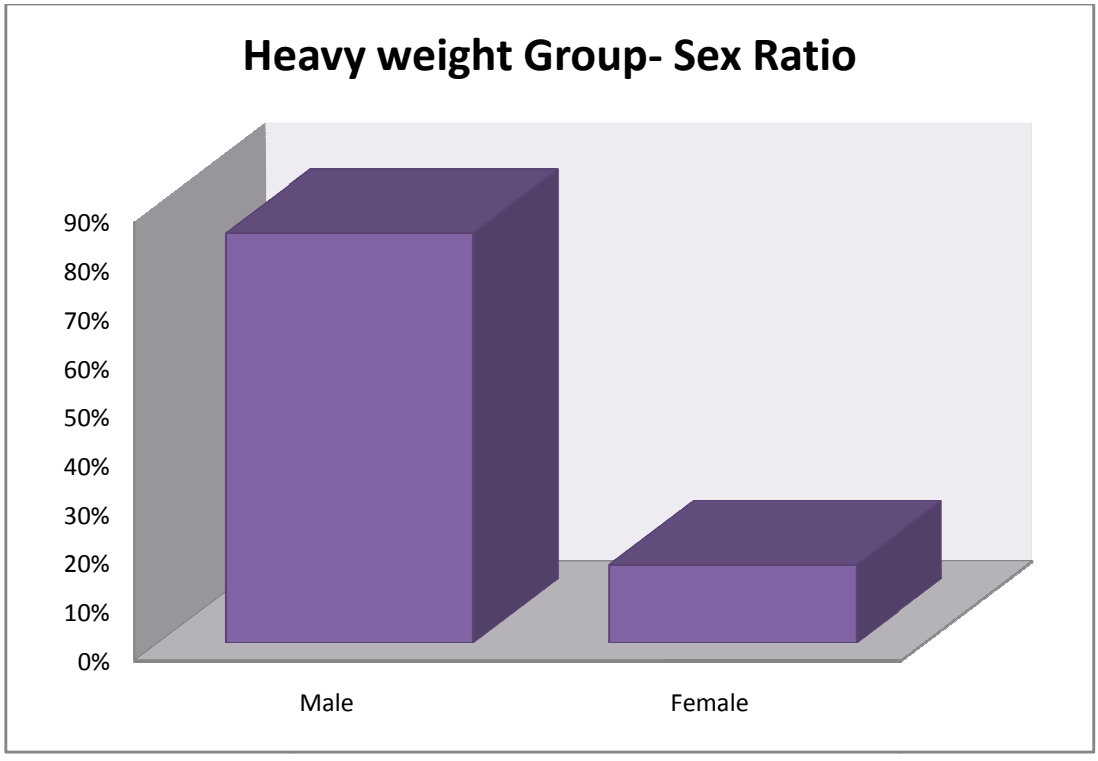
FOLLOW UP PICTURES

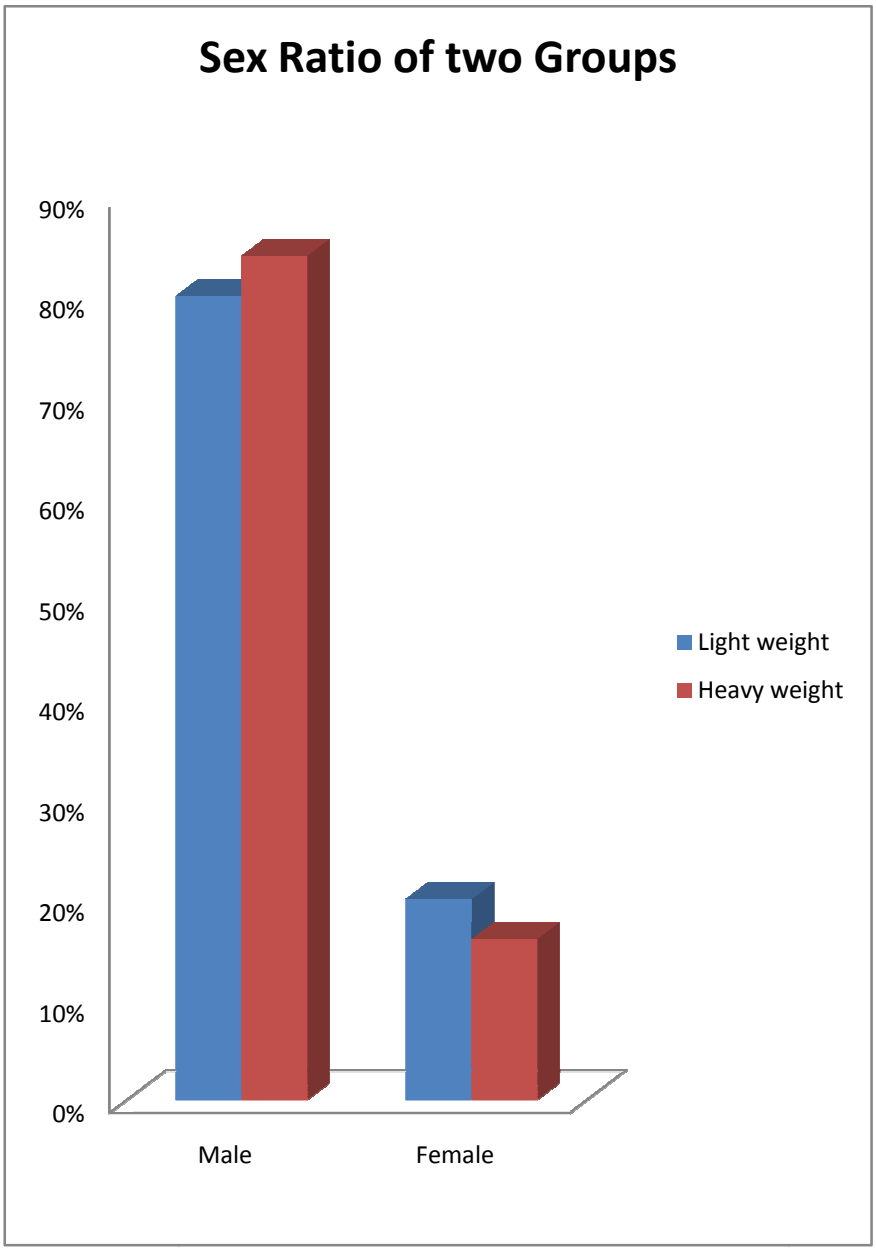
DATA ANALYSIS AND RESULTS

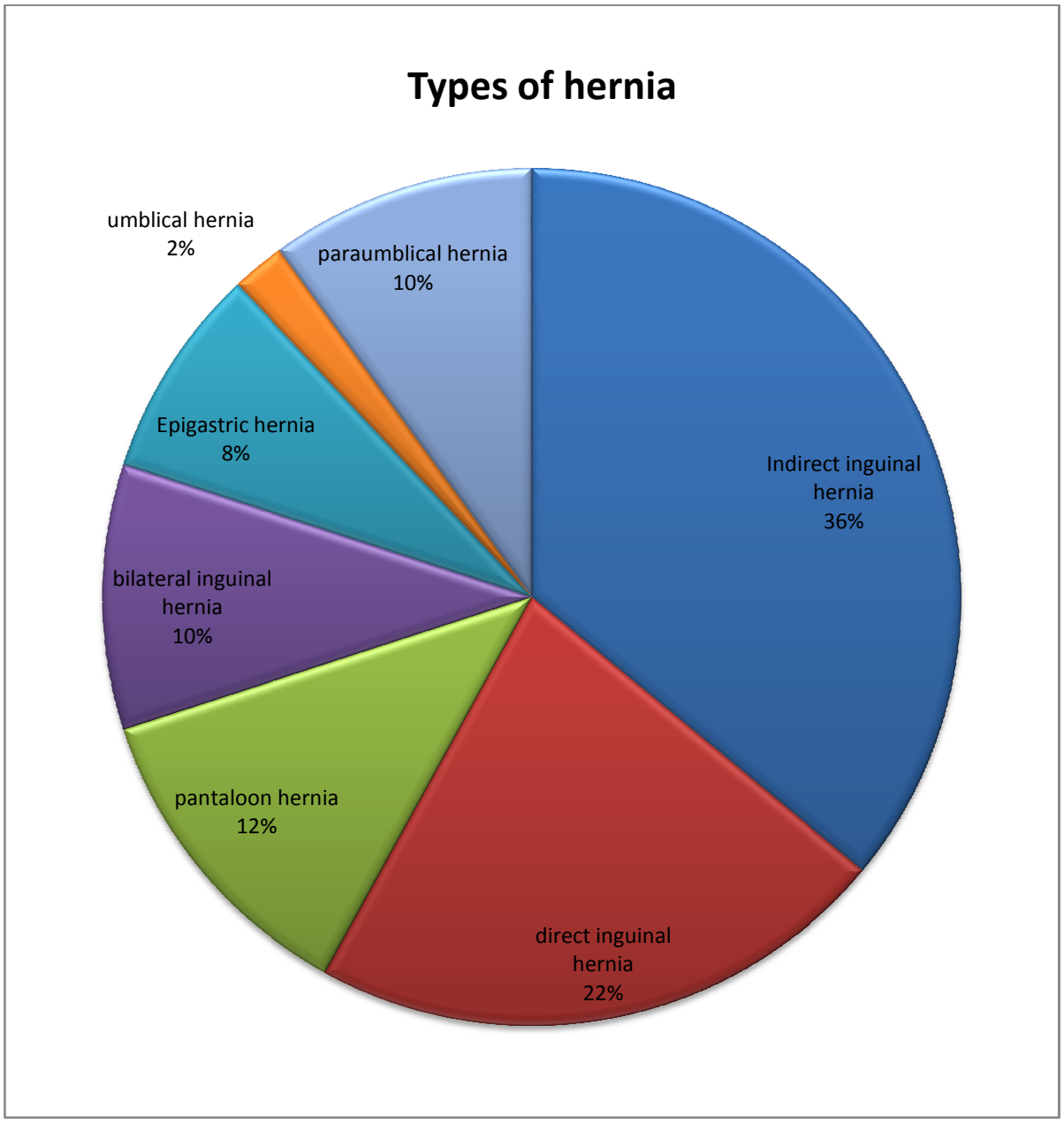

Age Group
No. of Patients
18
16
14
12
10
8
6
4
2
0
30-40
40-50
50-60
60-70
Age Groups

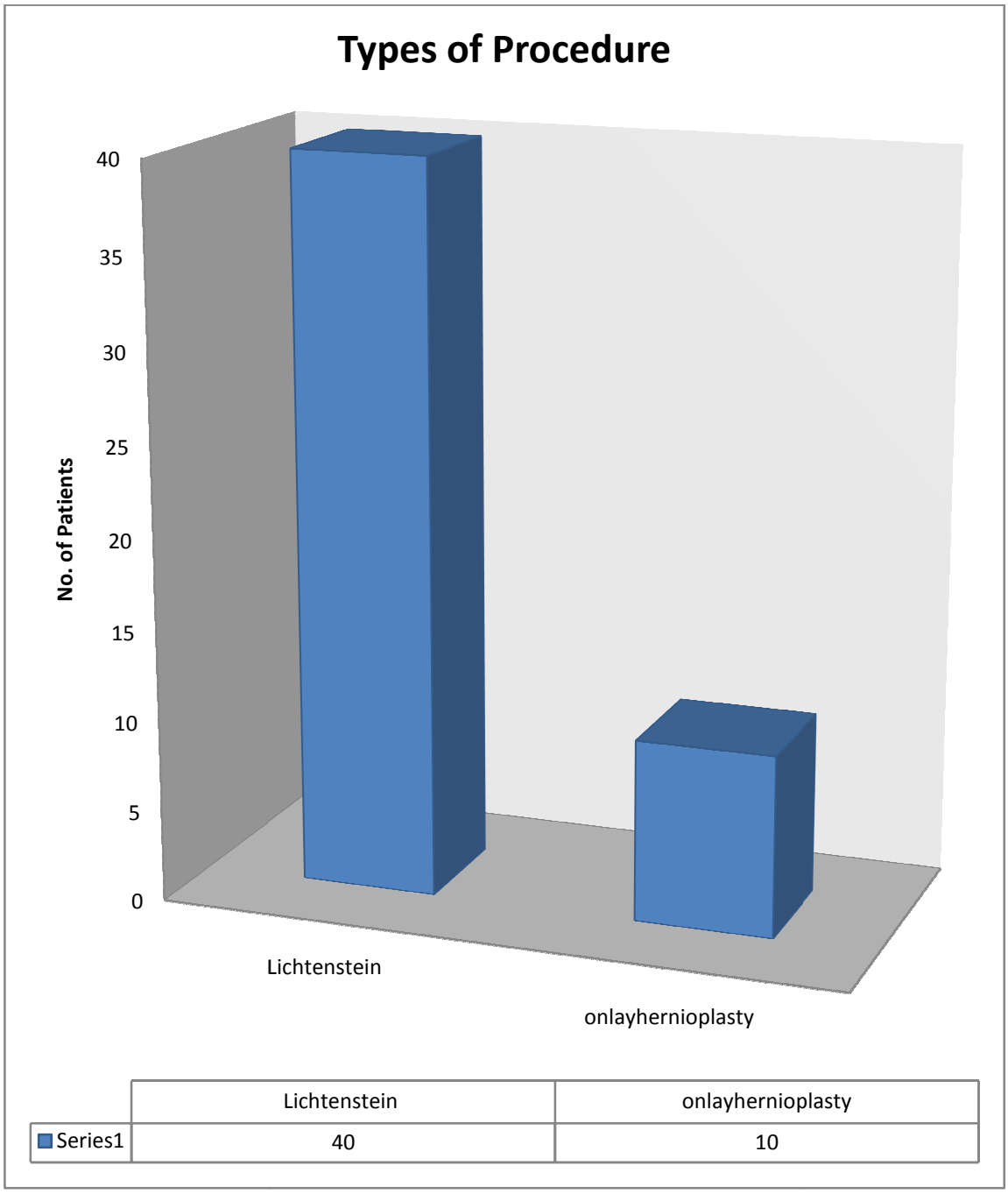

Total Sex ratio
Female
18%
Male
82%


Light weight Group- Sex Ratio
80%
70%
60%
50%
40%
30%
20%
10%
0%
Male
Female

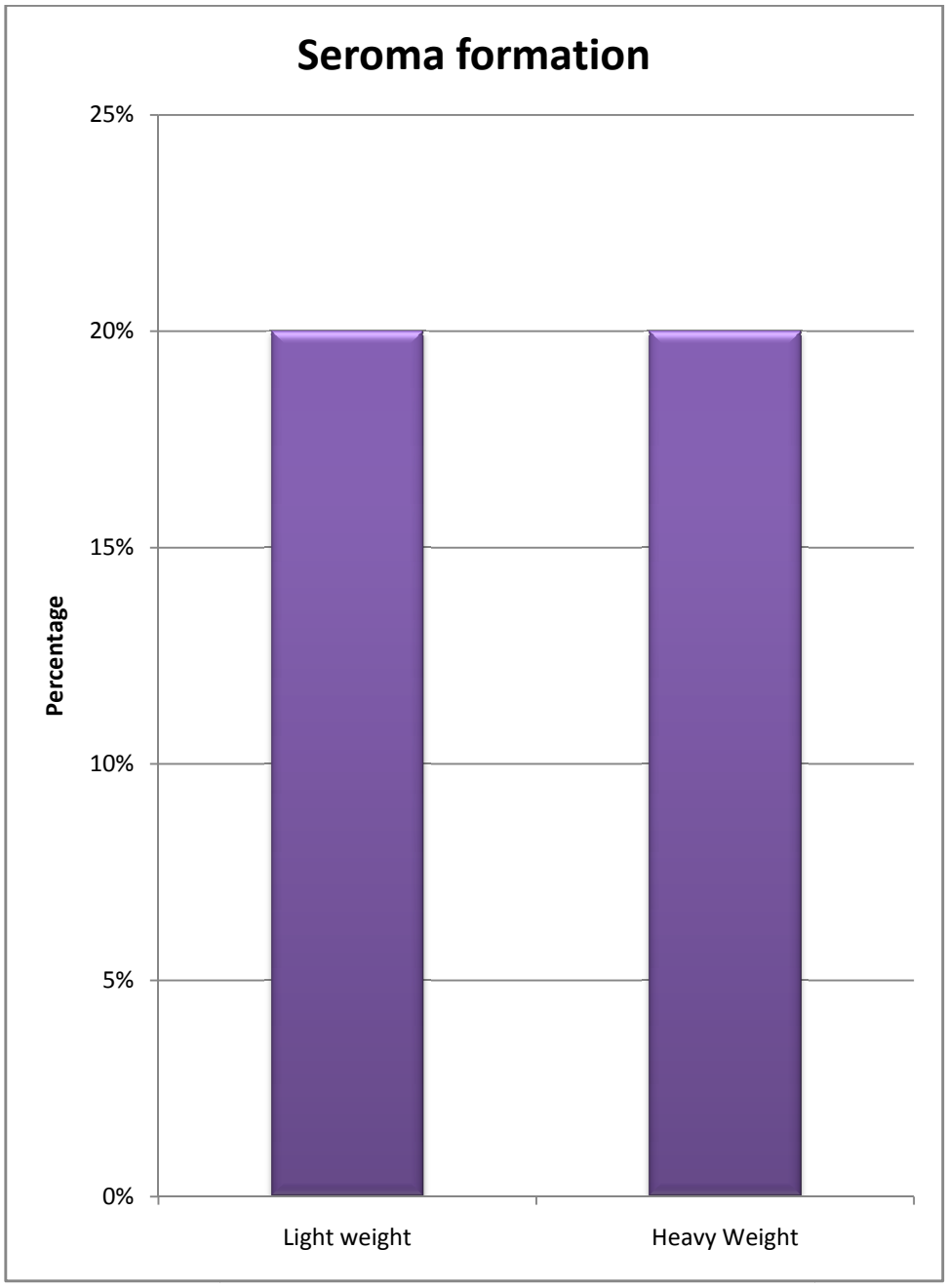

Heavy weight Group- Sex Ratio
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Male
Female


Sex Ratio of two Groups
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Male
Female
Light weight
Heavy weight


Types of hernia
umblical hernia
2%
paraumblical hernia
10%
Epigastric hernia
8%
Indirect inguinal
hernia
36%
bilateral inguinal
hernia
10%
pantaloon hernia
12%
direct inguinal
hernia
22%

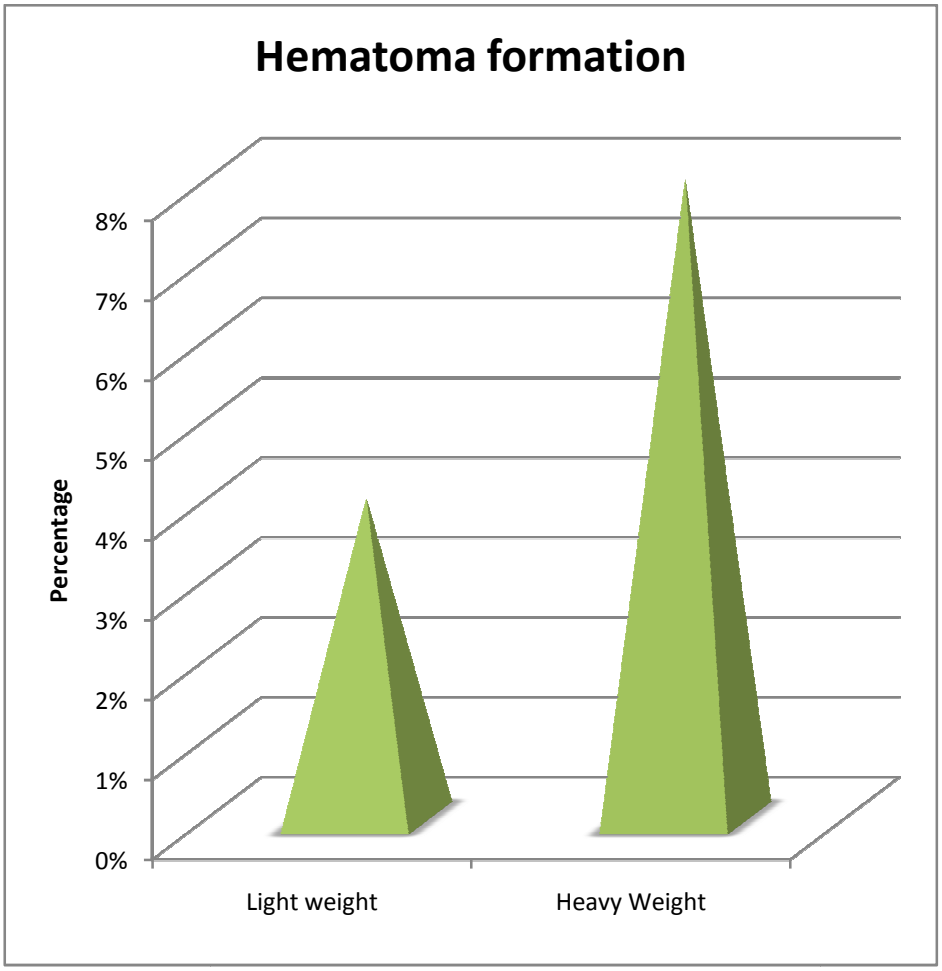


	Lichtenstein	onlayhernioplasty
Series1	40	10

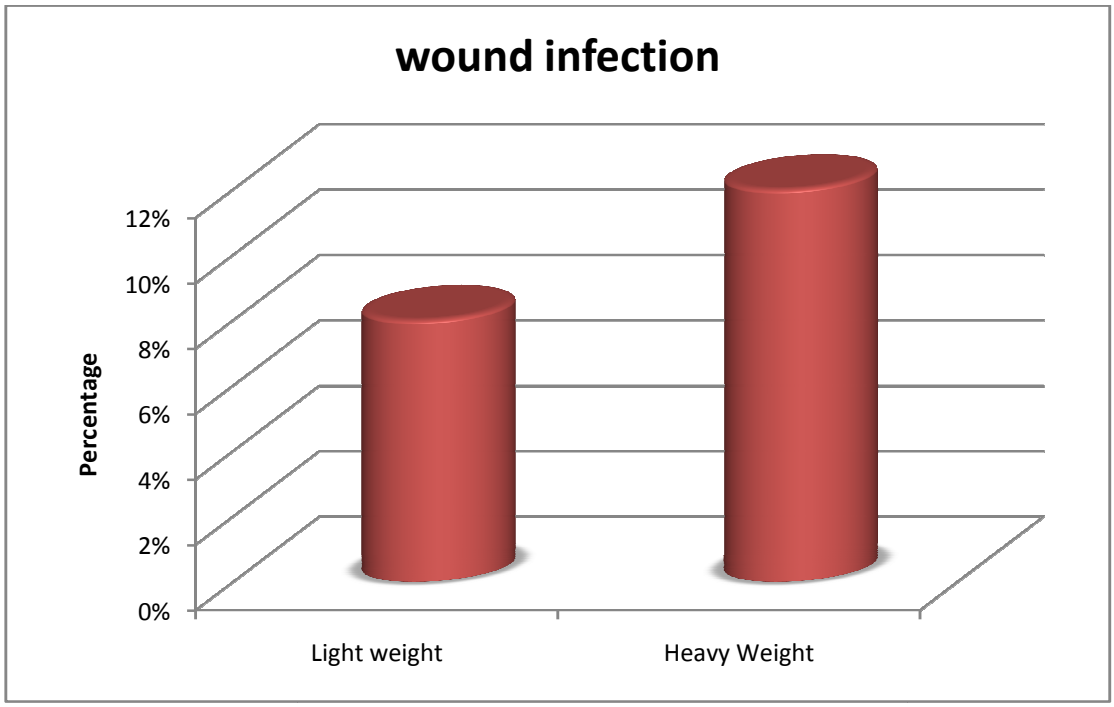

Seroma formation
25%
20%
15%
10%
5%
0%
Percentage
Light weight
Heavy Weight

PRE OP AND POST OP – SEROMA FORMATION

PRE OP AND POST OP – SEROMA FORMATION

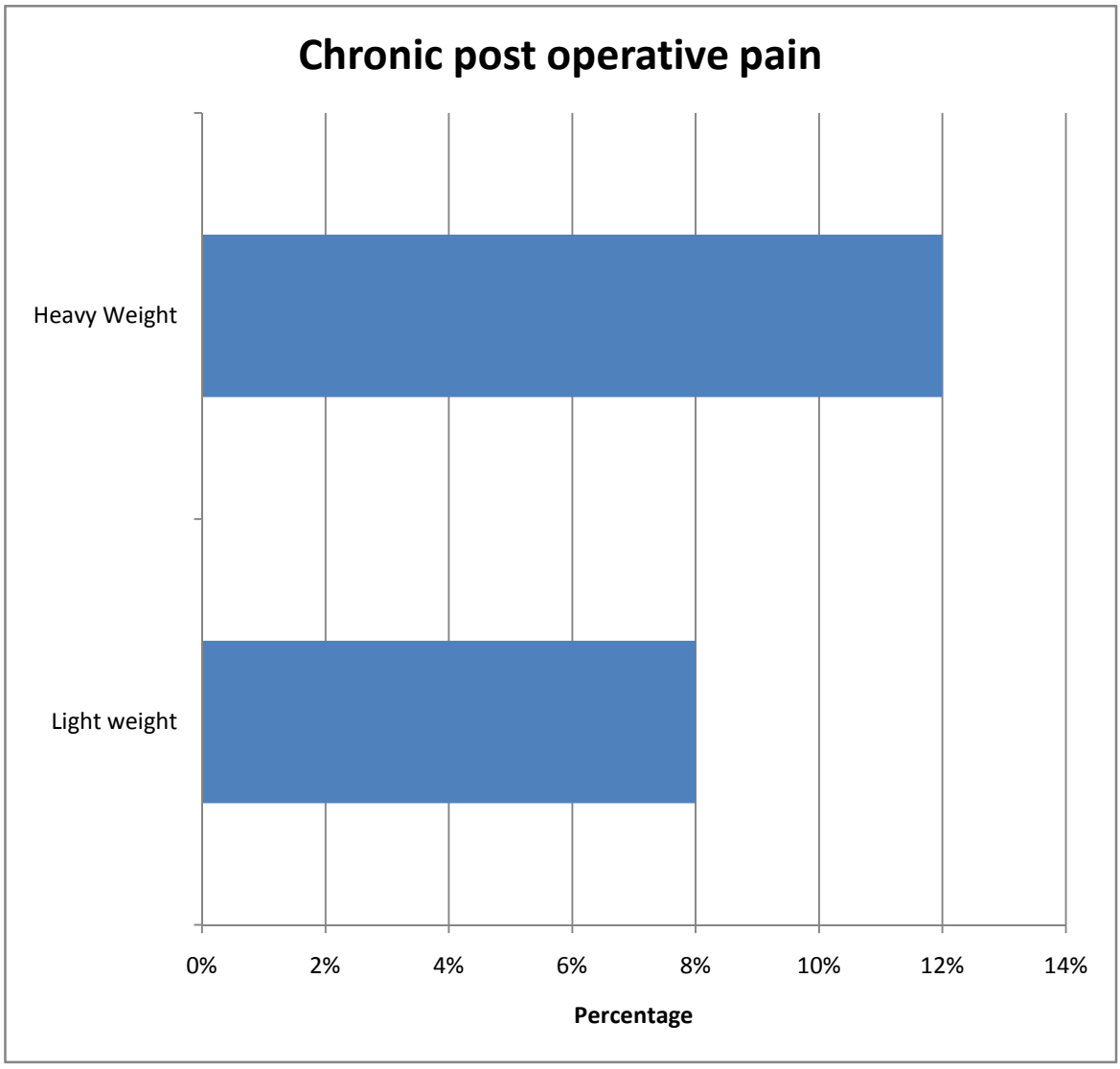


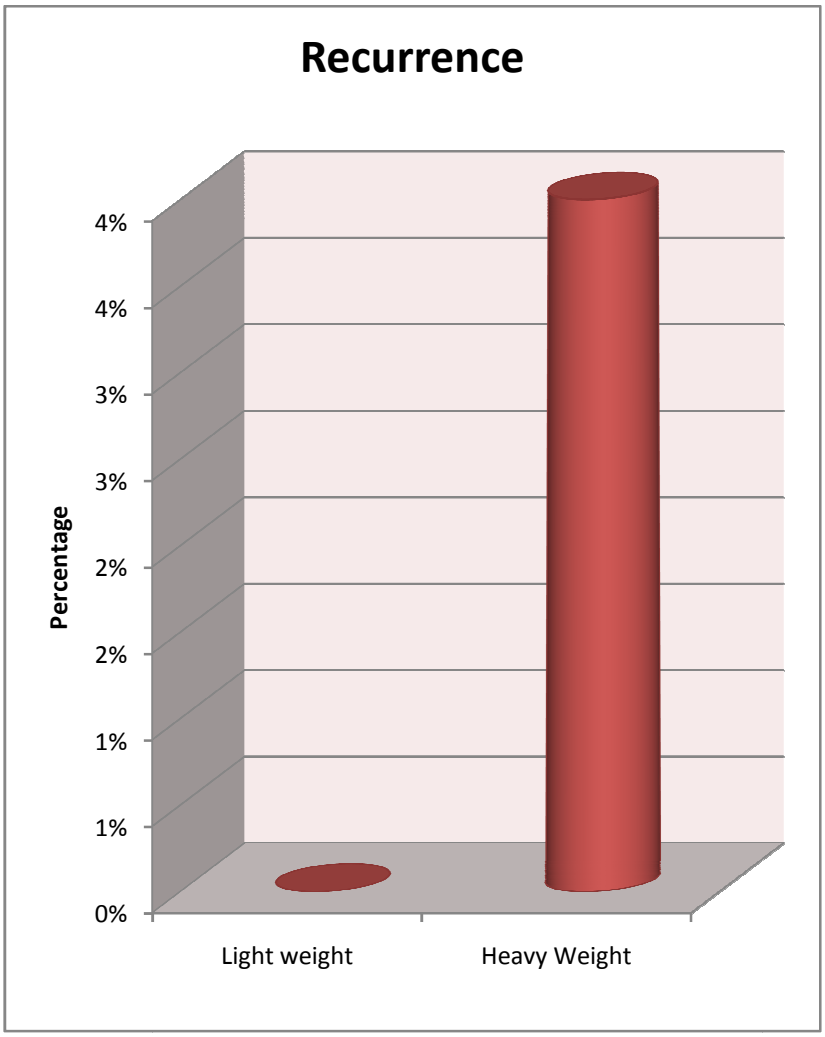
HEMATOMA IN A POST OPERATIVE PATIENT



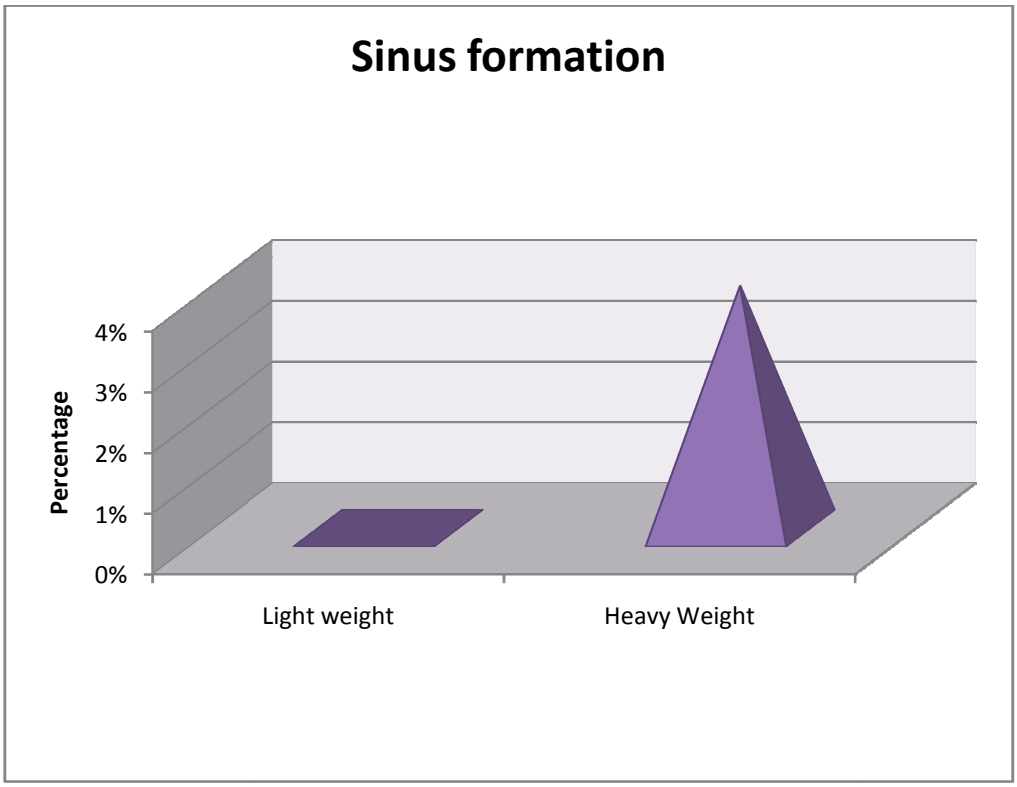
POST OPERATIVE WOUND INFECTION

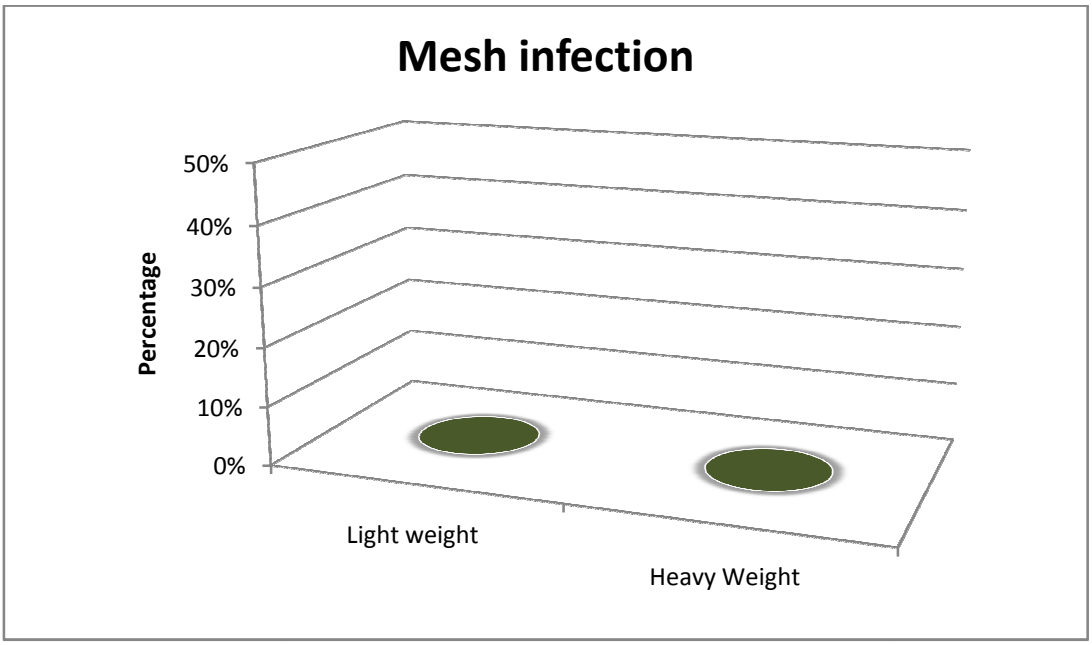
WOUND INFECTION

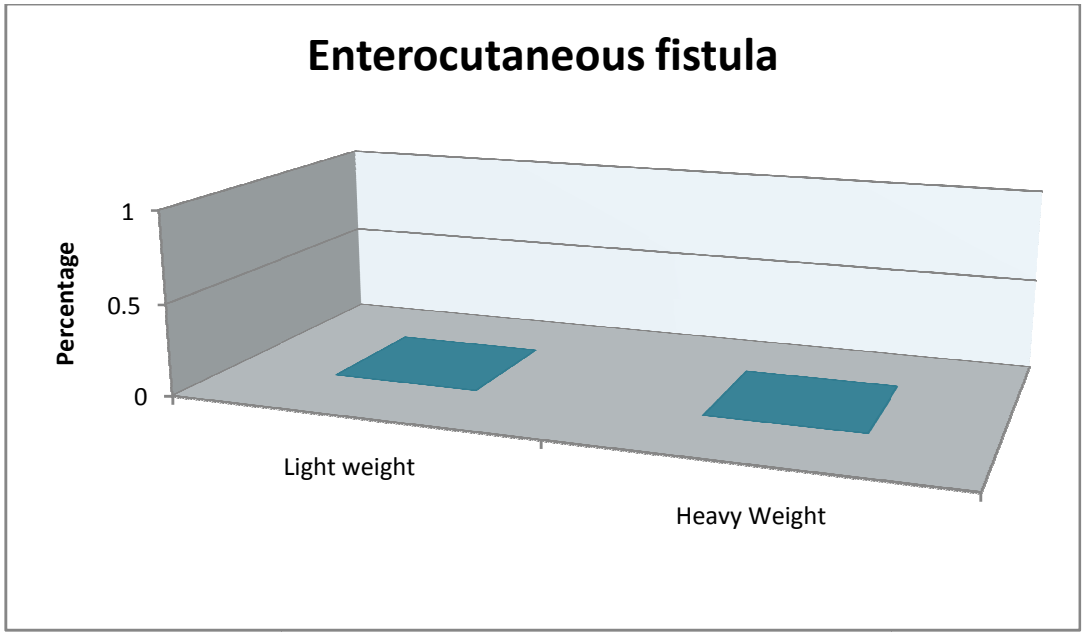

Chronic post operative pain
Heavy Weight
Light weight
0%
2%
4%
6%
8%
10%
12%
14%
Percentage

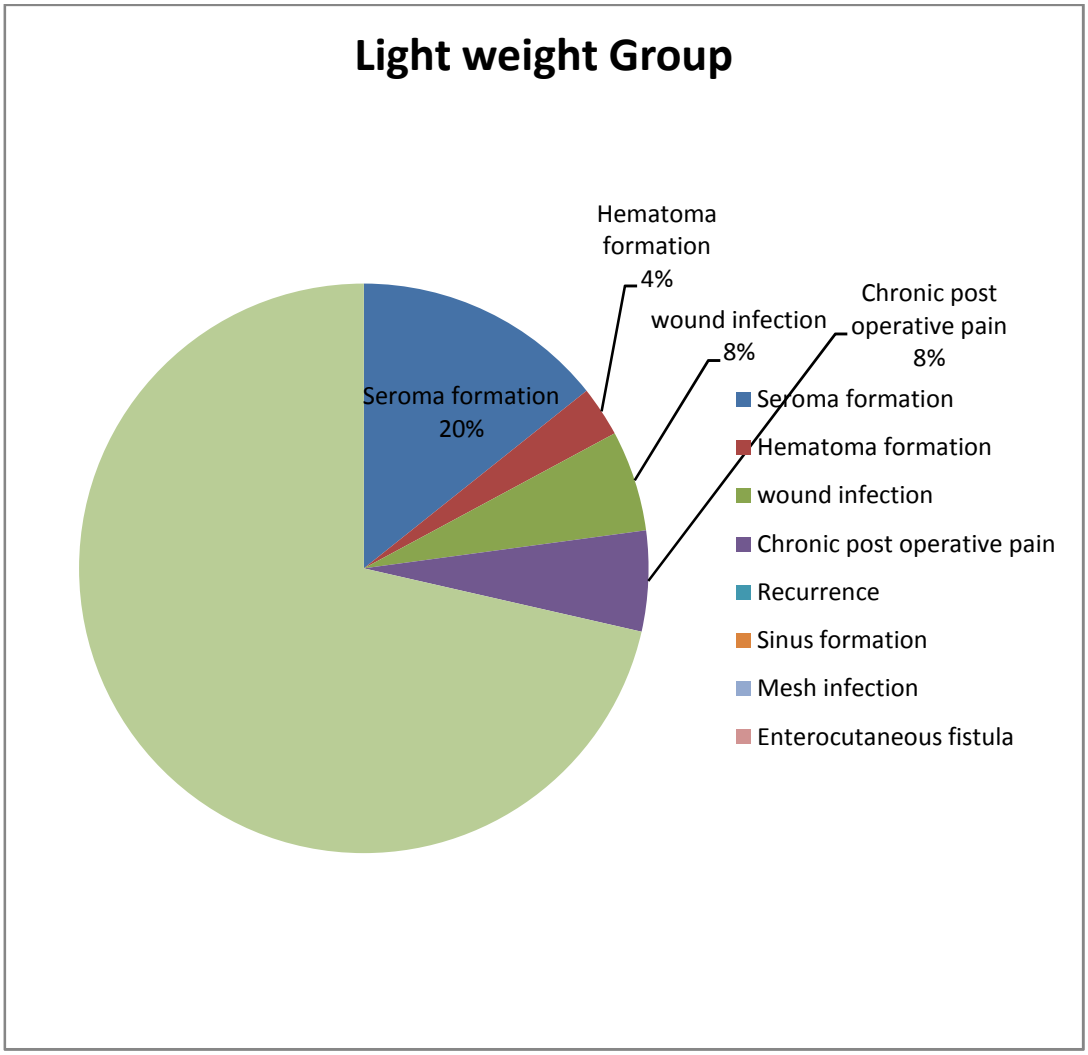

Recurrence
Percentage
4%
4%
3%
3%
2%
2%
1%
1%
0%
Light weight
Heavy Weight

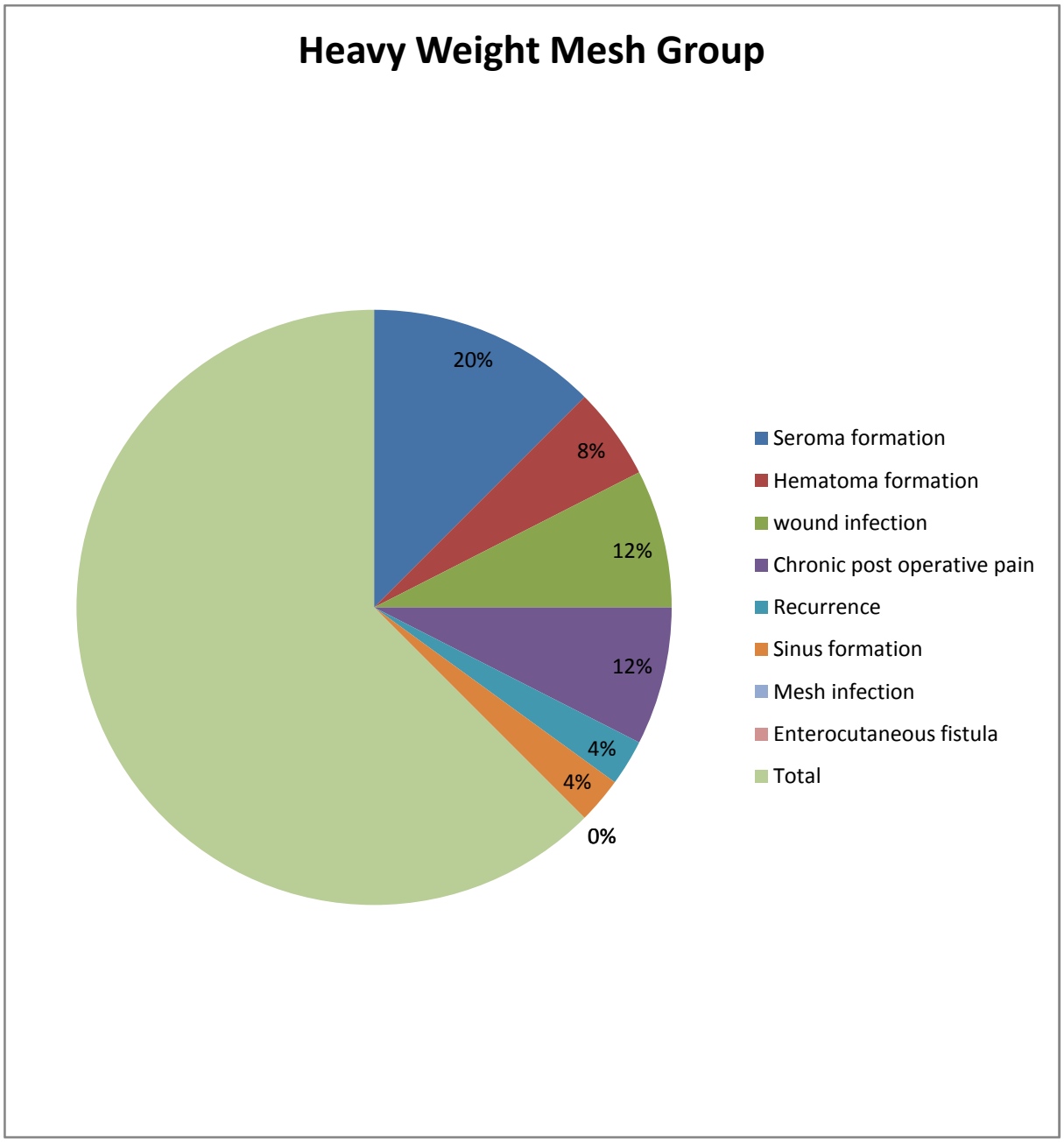
PRE OP AND POST OP – RECURRENCE

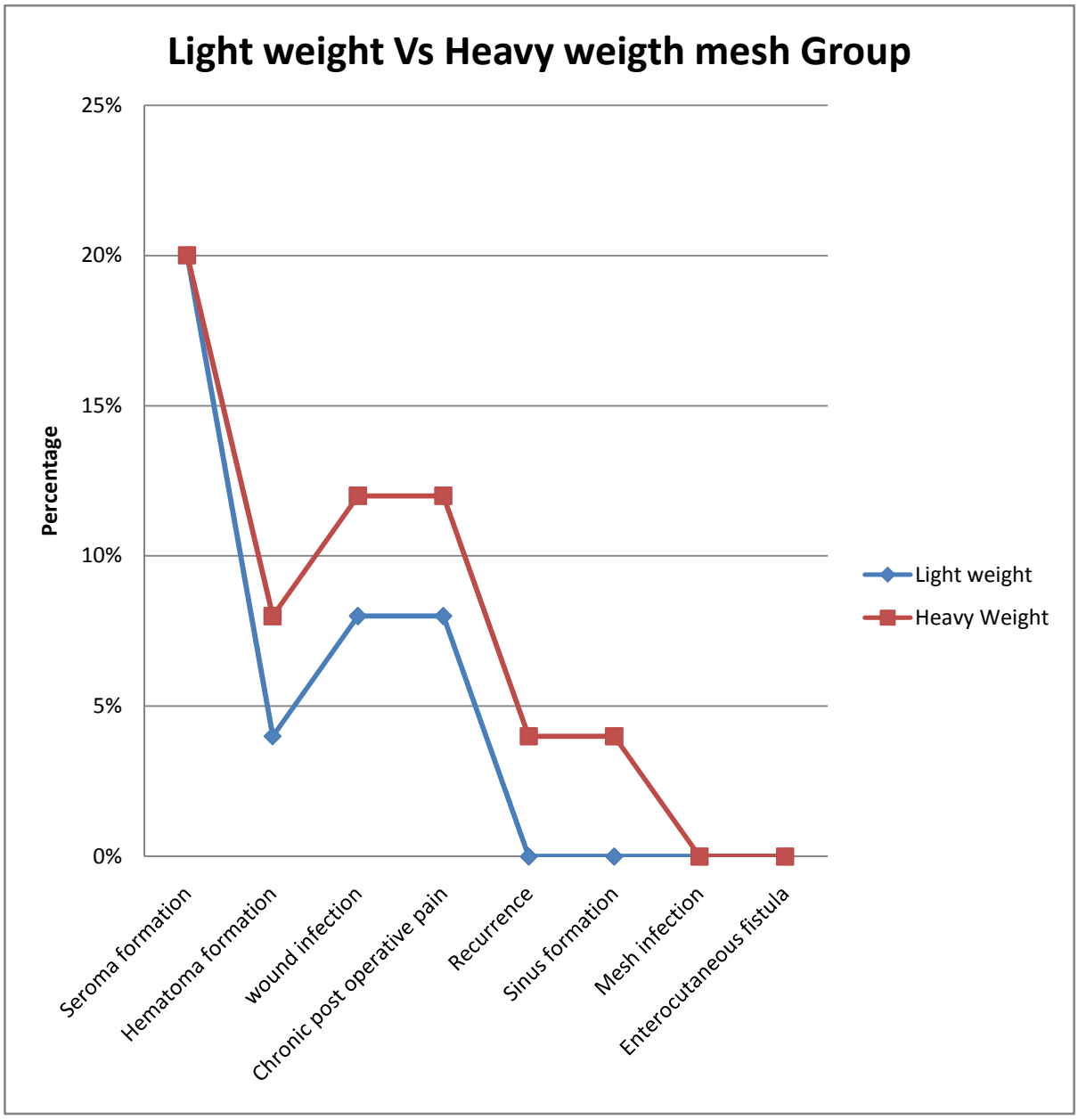

Sinus formation
Percentage
4%
3%
2%
1%
0%
Light weight
Heavy Weight


Mesh infection
50%
40%
30%
20%
10%
0%
Percentage
Light weight
Heavy Weight


Enterocutaneous fistula
1
0.5
0
Percentage
Light weight
Heavy Weight


Light weight Group
Hematoma formation 4%
wound infection 8%
Chronic post operative pain 8%
Seroma formation 20%
Seroma formation
Hematoma formation
wound infection
Chronic post operative pain
Recurrence
Sinus formation
Mesh infection
Enterocutaneous fistula


Heavy Weight Mesh Group
20%
8%
12%
12%
4%
4%
0%
Seroma formation
Hematoma formation
wound infection
Chronic post operative pain
Recurrence
Sinus formation
Mesh infection
Enterocutaneous fistula
Total


Light weight Vs Heavy weigth mesh Group
25%
20%
15%
10%
5%
0%
Percentage
Seroma formation
Hematoma formation
wound infection
Chronic post operative pain
Recurrence
Sinus formation
Mesh infection
Enterocutaneous fistula
Light weight
Heavy Weight

RESULT

The study is a comparative study between two groups. The 50 patients has been divided into two equal groups, one group of 25 patients operated with light weight composite mesh and other group of 25 patients operated with heavy weight polypropylene mesh. The age group of patients, sex of patients, types of hernia operated, surgery performed, post operative complication analyzed in each group, common and least complication in each group were analyzed and the data are shown below.

The analysis of age incidence of hernia showed Out of 50 patients who were included in study, who were in age group 30 – 70years, 18 patients (36%) are in age group 30 – 40, 11 patients (22%) in 40 – 50 age group, 12 patients (24%) in 50 – 60 age group and 9 patients (18%) in 60 – 70 age group. The sex ratio of the patients were analyzed and it shows that out of 50 patients, 41 patients (82%) are males and 9 patients (18%) are females. In the light weight mesh group out of 25 patients, 20 patients (80%) are males, 5 patients (20%) are females. In the heavy weight mesh group out of 25 patients, 21 patients (84%) are males and 4 patients (16%) are females.

The various types of hernia is analyzed in this study group which showed indirect inguinal hernia is the most common presentation in patients included in this study and it accounts for 36 % (18 patients) of study group. Other types of hernia analyzed in this study are direct inguinal hernia 22% (11 patients), pantaloon hernia 12% (6 patients), bilateral inguinal hernia 10% (5 patients), paraumbilical hernia 10% (5 patients), epigastric hernia 8 % (4 patients), umbilical hernia 2% (1 patient). Lichtenstein repair has been done for 80% (40 patients) of patients in study and onlay meshplasty for 20% (10 patients) in study.

The post operative complications following hernioplasty has been recorded individually in all patients of both groups and compared between them. The results of comparison is discussed below.

The incidence of seroma formation in light weight composite mesh group patients is 20% (5 patients) and that of heavy weight mesh group is the same 20% (5 patients). The incidence of hematoma formation is found to be 4% (1 patient) in light weight mesh group and 8% (2 patient) in heavy weight mesh group. The incidence of wound infection is found to be 8% (2 patients) in light weight mesh group and 12% (3 patients) in heavy weight group. The incidence of chronic post operative pain is 8% (2 patients) in light weight mesh group patients and 12% (3 patients) in heavy weight

mesh group patient. The incidence of recurrence is 4% (1 patient) in heavy weight mesh group and no recurrence in light weight mesh group. The incidence of sinus formation in this study is 4% (1 patient) in heavy weight mesh group and none in light weight mesh group. There is no incidence of mesh infection and enterocutaneous fistula in this study.

STATISTICAL ANALYSIS

Chi square test and Fisher exact probability test are the two statistical tests used in this study. The p value should be less than 0.05 for the test to be considered significant.

The data was analyzed using statistical software package SPSS version 19.0.

Total number of patients included in this study was 50 out of which 41 are males and 9 are female. In the Light weight mesh group of 25 patients, 20 patients are males and 5 patients are females. Total number of patients included in Heavy weight mesh group was 25, out of which males are 21 and females are 4. Chi square test is first applied for this group to identify whether both groups can be comparable. The values got are chi square – 0.00, p value – 0.50. It is inferred that both groups are similar and comparative analysis can be done between the both groups. The post operative complications observed between the two groups are qualitatively analyzed and compared and results are shown below.

S.No	COMPLICATIONS	Chi Square test / Fisher's exact test	P value
1.	SEROMA FORMATION	0.00	1.00
2.	HEMATOMA FORMATION	0.00	1.00
3.	WOUND INFECTION	0.00	1.00
4.	CHRONIC POST OPERATIVE PAIN	0.00	1.00
5.	RECURRENCE	0.00	1.00
6.	SINUS FORMATION	0.00	1.00
7.	MESH INFECTION	Not applicable	-
8.	ENTEROCUTANEOUS FISTULA	Not applicable	-

Chi square test is applied for patients who got seroma in post operative period. Fisher's exact probability is used for analysis of patients who got other complications like hematoma formation, wound infection,

chronic post operative pain, recurrence, sinus formation. Since there are no incidence of mesh infection and enterocutaneous fistula statistical analysis cannot be applied for these variables. The value got from chi square test is 0.00 for all patients. So p value is calculated as 1.00.

Statistical analysis of all the variables using chi square test or fisher's exact probability test identifies p value was 1.00. Since the p value was much higher, it is inferred that statistically there is no significant difference between complications observed in both groups.

DISCUSSION

DISCUSSION

Patients who are treated in this study are more in the age group of 30 – 40 years. It can be inferred by then that the incidence of hernia is higher in patients of age group of 30 – 40 years followed by 50 – 60 age group. This study group includes more of male patients. By this study incidence of hernia is more in male patients.

Indirect inguinal hernia is the most common type of hernia in this study followed direct inguinal hernia, pantaloon hernia, paraumbilical and epigastric hernia. The type of hernia may have confounding effect on post operative complications which we are analyzing. Seroma formation may be common following some of procedures like epigastric hernia repair where there is dead space post operatively. Seroma may get infected and complications so on. Since indirect inguinal hernia is the most common hernia which we are analyzing in this study and dead space formation in lichtenstein repair is least, this confounding influence may have lesser effect on results of this study. Lichtenstein repair and Onlay hernioplasty are the two surgical procedures done in this study for abdominal wall hernia. The mesh used depends on the group to which patients are allotted. Lichtenstein repair is the most commonly performed hernia surgery in this study.

Twenty percent of patient in each group had seroma formation. Seroma formation is the most common post operative complication we have encountered in this study. Hematoma formation is found to be more with heavy weight mesh group though the difference is negligible. Wound infection depends on various factors like patient's immune status, pre operative antibiotic, sterile surgical technique, chance of dead space formation and subsequent infection, type of mesh used, post operative wound dressing, patient's hygiene.

Chronic post operative pain is any pain persisting in operative site even after 3 months following surgery. One of the main post operative complication which is analyzed giving due importance is chronic pain, which is troublesome for patient, which also affects the quality of life of patient following surgery. The incidence of chronic post operative pain is higher with heavy weight mesh group patients. Though the difference in chronic pain is seemingly minimal, it needs to be given importance since it is the most troublesome complication for patient for which he may need to get treatment even 3 months after surgery.

The incidence of recurrence rate is found high with heavy weight mesh group patient. One of the rare complication which we never expect to occur. The immediate recurrence following surgery most commonly is due

to inadequate mesh fixation medially, whereas recurrence after a quiet long period can be attributed to various factors like predisposing factor with patient, type of mesh used and so on. Sinus formation following hernioplasty is extremely rare. The difference in type of mesh and composition of mesh may have influence on subsequent seroma formation, infection and sinus formation. Granuloma followed by sinus formation is most commonly due to polypropylene component of mesh by foreign body reaction. One patient had sinus formation post operatively. The patient was admitted and wound exploration done under field block and sinus tract along with part of mesh is excised and resutured. Patient recovered well. Mesh infection is the worst complication to deal with. Infected part of mesh or sometimes complete mesh needs to be removed for complete cure. No cases of enterocutaneous fistula and mesh infection is seen in this study.

In the heavy weight mesh group, seroma was the most commonly encountered complication in this study. Chronic post operative pain and Wound infection is the second most complication encountered. Hematoma formation, sinus formation and recurrence are also seen. There is no incidence of mesh infection and enterocutaneous fistula in the six months study period in this group.

In the light weight mesh group also, Seroma formation remains the most commonly found event post operatively. Chronic post operative pain and wound infection remains the second most common event. Hematoma formation is least encountered. However there is no incidence of recurrence, sinus formation, mesh infection and enterocutaneous fistula in this group.

Comparative analysis of data shows seroma formation remains most commonly found complication in both groups and equal in both group. Incidence of chronic post operative pain and wound infection is found to be more with heavy weight mesh group than light weight group. Recurrence and sinus formation has been reported in heavy weight group but not reported in light weight group. Hematoma formation is also more with heavy weight group. There are no incidence of mesh infection or enterocutaneous fistula in both group.

The overall comparative analysis of all the observed data from both group shows that patients included in light weight mesh group of hernioplasty for anterior abdominal wall hernia have encountered lesser post operative complication and morbidity than those in heavy weight mesh group. Though the complications encountered is minimal, it seems the light weight mesh is better tolerated by most patients. The data needs to be

further analysed to bring out the statistical importance of the study to confirm the apparent difference which we got in the data analysis.

PROFORMA

PROFORMA

- Patient name: Age: Sex:
- IP No: Hospital:
- Chief complaint:
- Past history:
- Personal history:
- General examination:
- Vitals
    - Pulse rate:
    - Blood Pressure:
    - Temperature:
- Abdominal examination:
    - Inspection
    - Palpitation
    - Percussion

    - Auscultation

- Per Rectal Examination:
- Per Vaginal Examination:
- Cardiovascular System:
- Respiratory System:
- Central nervous System:
- Diagnosis :
- Plan :

INVESTIGATIONS PERFORMED

BLOOD INVESTIGATION

- Complete blood count
- Renal function test
- Urine routine
- Blood grouping

IMAGING INVESTIGATIONS

- X ray
- USG Abdomen

COMPLICATIONS ANALYSED POST OPERATIVELY

- Seroma formation
- Hematoma formation
- Chronic post operative pain
- Wound infection
- Recurrence
- Sinus formation
- Mesh infection
- Enterocutaneous fistula

CONCLUSION

CONCLUSION

Prosthetic mesh repair technique for abdominal wall hernia has dramatically improved from the past in respect with quality of mesh, composition and structure of mesh, patient tolerance and less morbidity. Prosthetic mesh repair has become gold standard procedure. So the importance of choice of mesh selection is gaining importance since different types of meshes are available in market.

This study is conducted mainly to compare the influence of composite light weight and heavy weight polypropylene mesh in patients after hernioplasty, so that we can come up with better quality mesh for future hernioplasty. The fabric weight of two types of mesh is the primary characteristics of mesh which we analyzed in this study. Different other characteristics of the mesh although can influence post operative complications.

The data observed over a period of six months individually for each patient in both group were compiled and analyzed. Analysis of data showed that the incidence of seroma formation, hematoma formation, chronic post operative pain are higher with heavy weight polypropylene mesh group. There is also one case of recurrence and sinus formation in

heavy weight mesh group which is not reported in light weight mesh group. But the differences in the incidence of complications between the both groups are negligible. The data obtained are further statistically analyzed using chi square and fisher's exact probability test and it is proved that there is no statistical difference between two groups. So it is inferred from the study that there is no significant difference between the use of composite light weight mesh and heavy weight polypropylene mesh.

There are various issues in this study which needs to be further evaluated and analyzed in future studies. The sample size of this study is small and also it is a single centre study. The observations are only qualitatively compared between the groups and not quantified. The period of follow up should be more for better comparative results.

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MASTER CHART

S.No	Name	Age	Sex	IP No	Diagnosis	Procedure	Type of Mesh	Post Operative Complications
1.	Moses	52	M	1300774	Left indirect inguinal hernia	Lichtenstein Repair	Heavy Weight	Seroma formation
2.	Raja	40	M	1300781	Right direct inguinal hernia	Lichtenstein Repair	Heavy Weight	
3.	Kaleel	68	M	1301703	Right direct inguinal hernia	Lichtenstein Repair	Heavy Weight	-
4.	Narayanan	32	M	1300784	Left indirect inguinal hernia	Lichtenstein Repair	Heavy Weight	Seroma formation, Chronic post operative pain
5.	Gopal	57	M	1302033	Bilateral direct inguinal hernia	Lichtenstein Repair	Heavy Weight	-
6.	Kumar	52	M	1302354	Right direct inguinal hernia	Lichtenstein Repair	Heavy Weight	Hematoma formation
7.	James	61	M	1303013	Right indirect inguinal hernia	Lichtenstein Repair	Heavy Weight	Recurrence
8.	Prakash	70	M	1302750	Left pantaloon hernia	Lichtenstein Repair	Heavy Weight	-
9.	Mohan	61	M	1303003	Left indirect	Lichtenstein	Heavy	-

					inguinal hernia	Repair	Weight	
10.	Gowsbi	60	F	1302697	Paraumblical hernia	Onlay hernioplasty	Heavy Weight	Seroma formation
11.	Sekar	45	M	1303723	Left indirect inguinal hernia	Lichtenstein Repair	Heavy Weight	-
12.	Thandapani	69	M	1304423	Bilateral direct inguinal hernia	Lichtenstein Repair	Heavy Weight	-
13.	Nagappan	58	M	1303130	Left indirect inguinal hernia	Lichtenstein Repair	Heavy Weight	-
14.	Bakthan	40	M	1306544	Right pantaloon hernia	Lichtenstein Repair	Heavy Weight	-
15.	Selvaraj	58	M	1306530	Right direct inguinal hernia	Lichtenstein Repair	Heavy Weight	Wound infection, sinus formation
16.	Perumal	65	M	1306903	Left direct inguinal hernia	Lichtenstein Repair	Heavy Weight	-
17.	Muguran	37	M	1308941	Right indirect inguinal hernia	Lichtenstein Repair	Heavy Weight	Seroma formation
18.	Sivakumar	43	M	1309115	Left indirect inguinal hernia	Lichtenstein Repair	Heavy Weight	Hematoma formation
19.	Natarajan	50	M	1308388	Left indirect inguinal hernia	Lichtenstein Repair	Heavy Weight	Seroma formation
20.	Vimala	33	F	1309445	Paraumblical	Onlay	Heavy	-

					hernia	hernioplasty	Weight	
21.	Sundaram	61	M	1310511	Left pantaloon hernia	Lichtenstein Repair	Heavy Weight	-
22.	Usha	32	F	1310130	Epigastric hernia	Onlay hernioplasty	Heavy Weight	-
23.	Raghu	45	M	1304439	Bilateral direct inguinal hernia	Lichtenstein Repair	Heavy Weight	Wound infection, Sinus formation, chronic post operative pain
24.	Ramasamy	48	M	1301403	Right indirect inguinal hernia	Lichtenstein Repair	Heavy Weight	Chronic post operative pain
25.	Veera Malliga	46	F	1307264	Paraumblical hernia	Onlay hernioplasty	Heavy Weight	Wound infection
26.	Gurusamy	60	M	1317427	Left direct inguinal hernia	Lichtenstein Repair	Light weight	Seroma formation
27.	Govindan	47	M	1316685	Epigastric hernia	Onlay hernioplasty	Light weight	-
28.	Rajan	32	M	1318442	Right indirect inguinal hernia	Lichtenstein Repair	Light weight	-
29.	Samsudeen	42	M	1318858	Left indirect inguinal hernia	Lichtenstein Repair	Light weight	-
30.	Viswanathan	65	M	1319138	Right direct	Lichtenstein	Light	-

					inguinal hernia	Repair	weight	
31.	Nalini	35	F	1318819	Paraumblical hernia	Onlay hernioplasty	Light weight	Seroma formation, Wound infection
32.	Amuda	35	F	1321020	Paraumblical hernia	Onlay hernioplasty	Light weight	-
33.	Madasamy	60	M	1320304	Bilateral direct inguinal hernia	Lichtenstein Repair	Light weight	-
34.	Jayagopal	31	M	1321018	Left indirect inguinal hernia	Lichtenstein Repair	Light weight	-
35.	Mani	58	M	1321378	Right pantaloon hernia	Lichtenstein Repair	Light weight	-
36.	Masilamani	50	M	1322108	Left indirect inguinal hernia	Lichtenstein Repair	Light weight	Hematoma formation
37.	Perumal	50	M	1323014	Bilateral inguinal hernia	Lichtenstein Repair	Light weight	-
38.	Rajamamar	65	M	1323448	Right pantaloon hernia	Lichtenstein Repair	Light weight	Chronic post operative pain
39.	Kuppan	40	M	1323872	Epigastric hernia	Onlay hernioplasty	Light weight	-
40.	Sumitha	31	F	1324249	Umbilical	Onlay	Light	Seroma formation

					hernia	hernioplasty	weight	
41.	Antony	32	M	1328184	Right indirect inguinal hernia	Lichtenstein Repair	Light weight	-
42.	Selvam	40	M	1327092	Right indirect inguinal hernia	Lichtenstein Repair	Light weight	-
43.	Perumal	51	M	1327432	Right direct inguinal hernia	Lichtenstein Repair	Light weight	-
44.	Anand kumar	32	M	1327118	Right direct inguinal hernia	Lichtenstein Repair	Light weight	Seroma formation, Wound infection
45.	Abdul sameer	48	M	1327923	Right pantaloon hernia	Lichtenstein Repair	Light weight	-
46.	Dakchinamoorthy	60	M	1327941	Right direct inguinal hernia	Lichtenstein Repair	Light weight	-
47.	Jeya	36	F	1328245	Epigastric hernia	Onlay hernioplasty	Light weight	-
48.	Raji	35	F	1324196	Right indirect inguinal hernia	Lichtenstein Repair	Light weight	-
49.	Damodaran	57	M	1322928	Right direct inguinal hernia	Lichtenstein Repair	Light weight	Seroma formation, chronic post operative pain
50.	Saravanan	39	M	1322195	Right indirect inguinal hernia	Lichtenstein Repair	Light weight	-